AUGUST 12, 1957

Howard Hughes' $500-million gamble . . . Page 30
AFA blasts Pentagon economics . . . Page 41
How competition hurts airlines . . . Page 75

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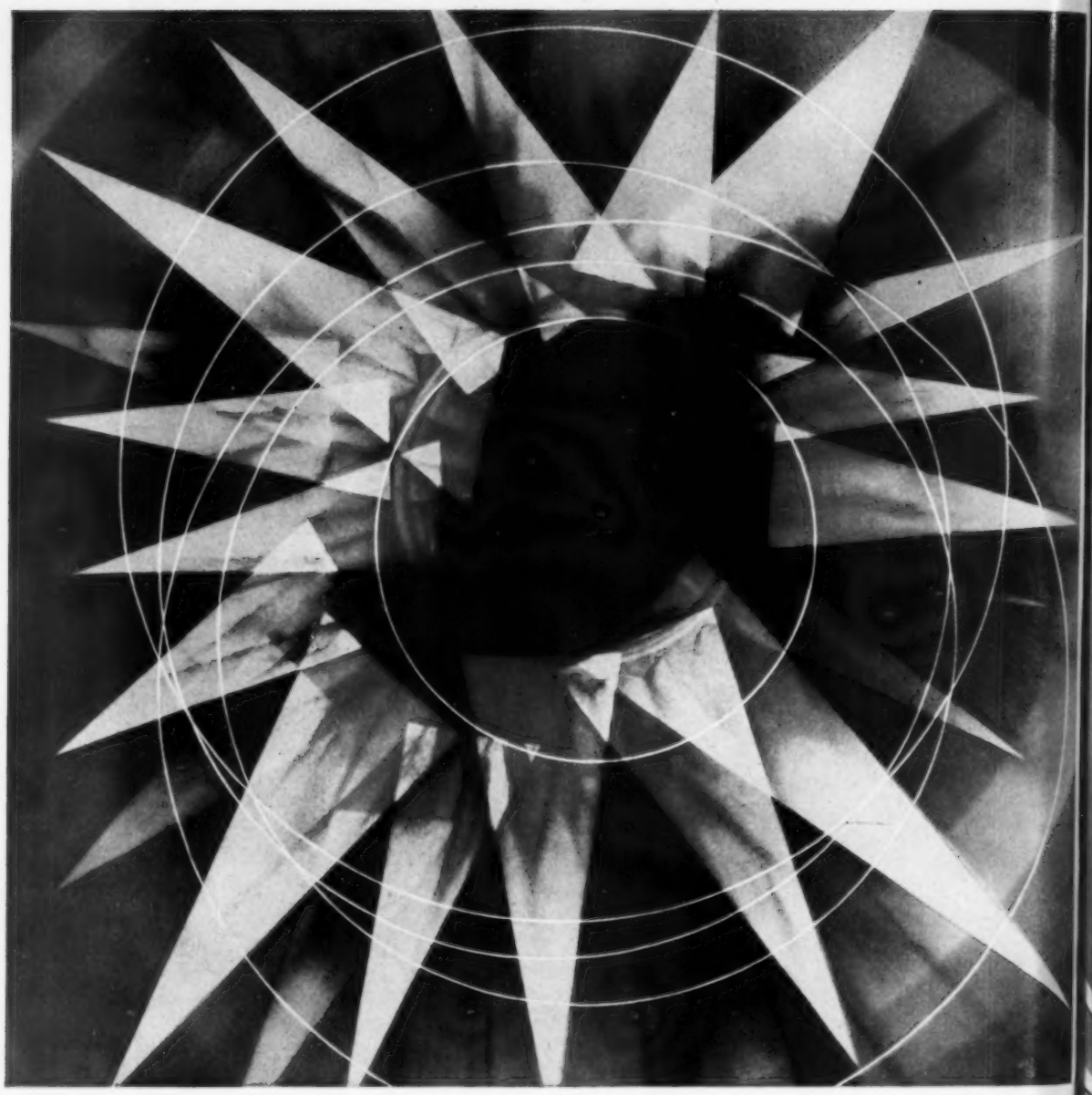

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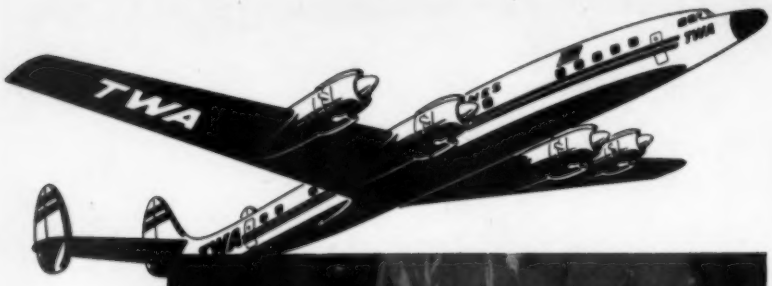
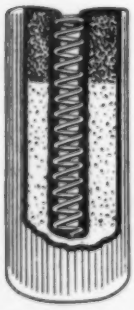


TWA's new Jetstream* is protected by WINSLOW Aerofilters



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AUGUST 12, 1957—VOL. 21, NO. 6

AMERICAN AVIATION

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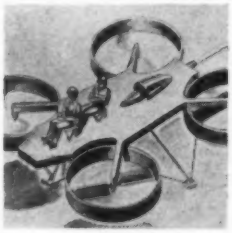
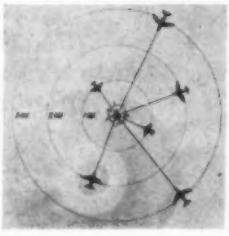


Three new aerial jeeps in the making
Army contracts totaling $1,702,637 have been awarded to three companies to build ducted-fan aerial jeeps. One shown here is four-ducted propeller testbed design submitted by Aerophysics Development Corp. Digest, page 23.

Bidding for jet age transport leadership
Multi-millionaire man of mystery Howard Hughes is reportedly ready to invest $500 million in new equipment for Trans World Airlines in bid for jet age transport leadership. He offers to buy 30 Bristol Britannias and is dickering for 22 Vickers Viscounts. Exclusive story by Wayne W. Parrish, page 39.

AF unveils F-105, J75-powered fighter-bomber
Republic Aviation Corp.'s F-105 Thunderchief, first supersonic fighter-bomber to be powered by Pratt & Whitney J75 turbojet, was unveiled by Air Force during 50th anniversary USAF show at Andrews AFB, Md. It can carry nuclear as well as conventional weapons. Page 49.



New approach to PWI problem
Sketch shows locations of intruding aircraft 20 seconds prior to collision with a 360-mph aircraft. This is one of problems Aerojet-General Corp. would solve with new 30-lb. proximity warning indicator based on infrared energy. See electronics story, page 63.

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Is Howard Hughes getting ready to make a serious bid for world transport leadership in the jet age? . . . The answer to that question is definitely yes, says AMERICAN AVIATION's editor and publisher Wayne W. Parrish in an exclusive article (page 39) telling how the unpredictable multi-millionaire manufacturer is planning to spend $500 million, if necessary, to put Trans World Airlines in the forefront of that history-making race.

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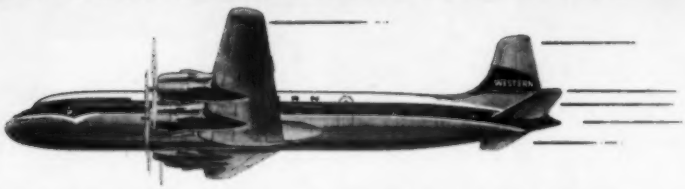
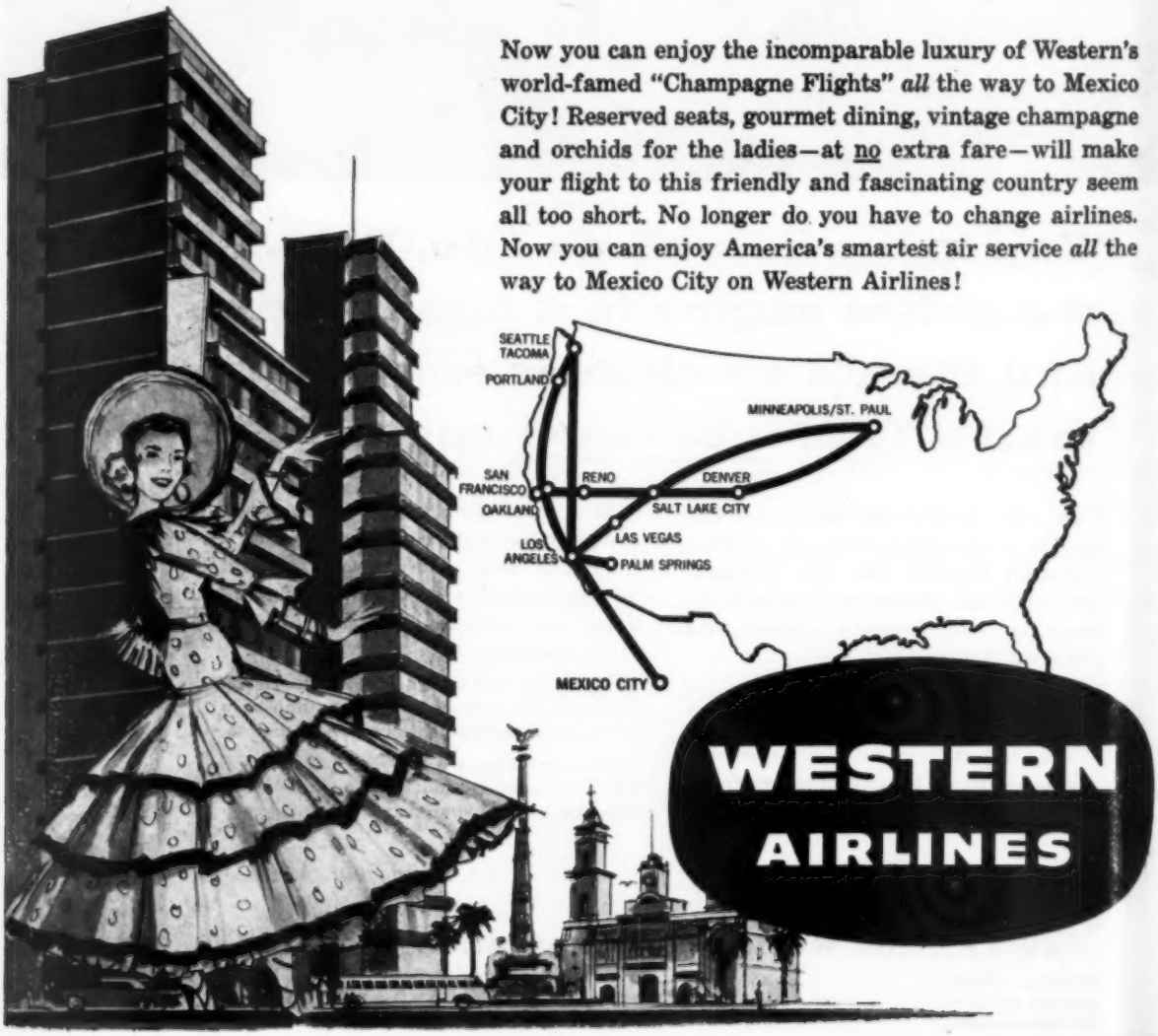


WESTERN AIRLINES

Champagne Flights to MEXICO CITY



Now you can enjoy the incomparable luxury of Western's world-famed "Champagne Flights" *all* the way to Mexico City! Reserved seats, gourmet dining, vintage champagne and orchids for the ladies—at no extra fare—will make your flight to this friendly and fascinating country seem all too short. No longer do you have to change airlines. Now you can enjoy America's smartest air service *all* the way to Mexico City on Western Airlines!

IATA Has Some Problems

TIME and the evolutionary nature of world air transport have caught the International Air Transport Association in a crisis from which it must extricate itself if it is to retain its high standing as a world trade body. Thus the annual general assembly which opens in Madrid on Sept. 9 is of vital interest.

The crisis is in two parts. One is the squabble over location of the headquarters and over which tempers have been rising unnecessarily. The other is the composition of the executive committee which really sets the pace for the organization.

Ever since the reorganization of IATA in Havana in the spring of 1945, headquarters have been in Montreal alongside those of the International Civil Aviation Organization. Now there is a strong disposition among some airlines to move to Geneva and the queston is pretty well divided, although on a numerical vote Geneva would probably win out.

It is probable that no firm decision can be reached in Madrid next month, but a compromise is possible. Two of the main functions of IATA are traffic and technical. Although not a very efficient way to operate a world organization, it is certainly possible to move traffic functions to Geneva and retain technical activities in Montreal.

But location is not nearly as important to the future of IATA as is the makeup of the executive committee. Because this committee is too largely populated by airline men who have graduated to board chairman positions or currently occupy posts removed from the head office, IATA is in dire danger of losing touch with the actual working world of air transport.

Certainly the men whose names are legendary in world airline circles and who have been the mainstay of IATA in its earlier years should have an honorary and honorable association with the organization. It should be relatively easy to form a council of elder statesmen whose views are still important.

But if IATA is to fill its destined dynamic role it must have its policies set and effectuated by men who occupy the chief executive positions with the world airlines. At the moment IATA is closer than it knows to losing the interest of chief executives. It has already lost some.

So the forthcoming Madrid assembly is important. Either IATA catches up with the working air transport world with a businesslike approach to its problems, or it will become an innocuous decorative piece, a sort of old gentlemen's club where no one dares raise a voice, and completely immersed in meaningless protocol, Victorian frills, pomp, formality, and more gobbledygook terminology than even a United Nations unit, if that is possible.

New High for AFA

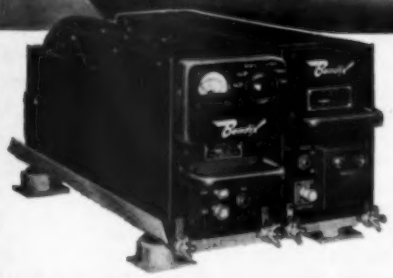
ANYONE who paid even the most casual attention to the Air Force Association convention in Washington early this month could scarcely fail to be impressed with the enormous vitality behind this showcase for air power. Timed as it was with the golden anniversary of the Air Force, AFA did itself proud as a platform and a forum for expounding of authoritative air power policies and programs.

Quite apart from its own sessions, AFA did an immensely effective job for the public with both a topflight outdoor air show at Andrews Field and an indoor airpower panorama in Washington's armory. Industry participation set a new high, highlighted perhaps by an exceedingly colorful and impressive reception sponsored by Lockheed that must have set a record of some sort.

Another record was most surely the golden anniversary luncheon, a masterful and moving program reflecting fifty years of USAF flight with a host of old-timers in reflected glory. When crusty oldsters never known before to be sentimental about anything conceded they had tears in their eyes, then the affair can only be described as a magnificent achievement historically.

So to Convention Chairman Carl A. (Tooey) Spaatz and AFA staffers Jim Straubel and Ralph Whitener, our heartiest applause for the most outstanding and best planned aviation affair in memory and one which performed a great deal of good for all including the public.

Wayne W. Parrish



TA-20 TRANSMITTER, RA-18 RECEIVER

Each provides 360 crystal-controlled channels from 118.0 to 135.95 megacycles with 50 kilocycle channel spacing. Receiver: 3-microvolt sensitivity with carrier-operated squelch control. Transmitter: 25 watts minimum of r-f output power.

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RG-9 RECEIVER, TG-19 TRANSMITTER

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The best way to talk to somebody is "in person." No question, then, about getting things straight. But, of course, it's out of the question in this age of travel.

The next best thing to do is to match this way of communicating as closely as you can. That's Bendix* VHF Airborne-Ground Communications.

The complete system consists of the RA-18 and TA-20 Airborne Receiver and Transmitter; and the RG-9 and TG-19 Ground Station Receiver and Transmitter. *Combined weight of the airborne units including power supplies is 49 lbs.*

TO DATE, 80% OF THE AIRLINES THAT HAVE CHANGED TO 360-CHANNEL OPERATION HAVE SPECIFIED BENDIX RA-18 RECEIVERS.

If you have a communications problem or are contemplating replacing your present equipment, we would like to present our story. Write us direct. Bendix Radio Division, Aviation Electronic Products, Baltimore 4, Maryland. Or West Coast—10500 Magnolia Blvd., North Hollywood, Calif.; Export—Bendix International Division, 205 East 42nd Street, New York 17, N. Y.

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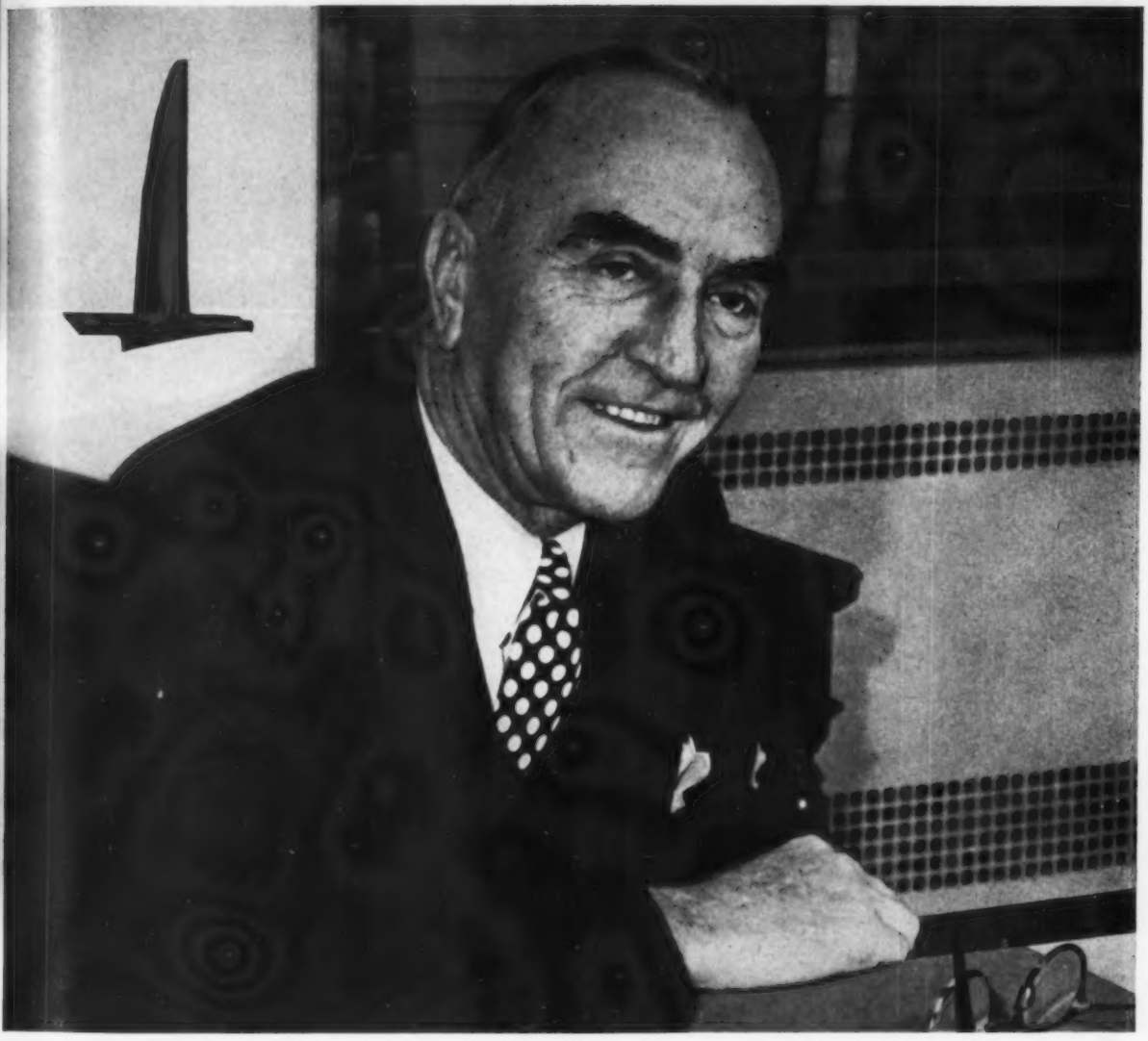

"Protecting our passengers and the tremendous investment Eastern has in 20 new DC-8 jets will be our biggest job"...

says Captain Eddie Rickenbacker, President, Eastern Airlines

By its single purchase order for 20 new Douglas DC-8 jets, Eastern Airlines makes the largest capital investment in its history. Naturally, realizing a profitable dollar return on these aircraft requires taking every precaution to protect them. Customers expect it, and stockholders demand it.

Thus, Eastern will have fire-resistant Skydrol-500 hydraulic fluid in its new jet fleet. Skydrol has flown more than 6,500,000 hours with 34 major airlines throughout the world . . . it's the only fire-resistant hydraulic fluid approved by the CAA.

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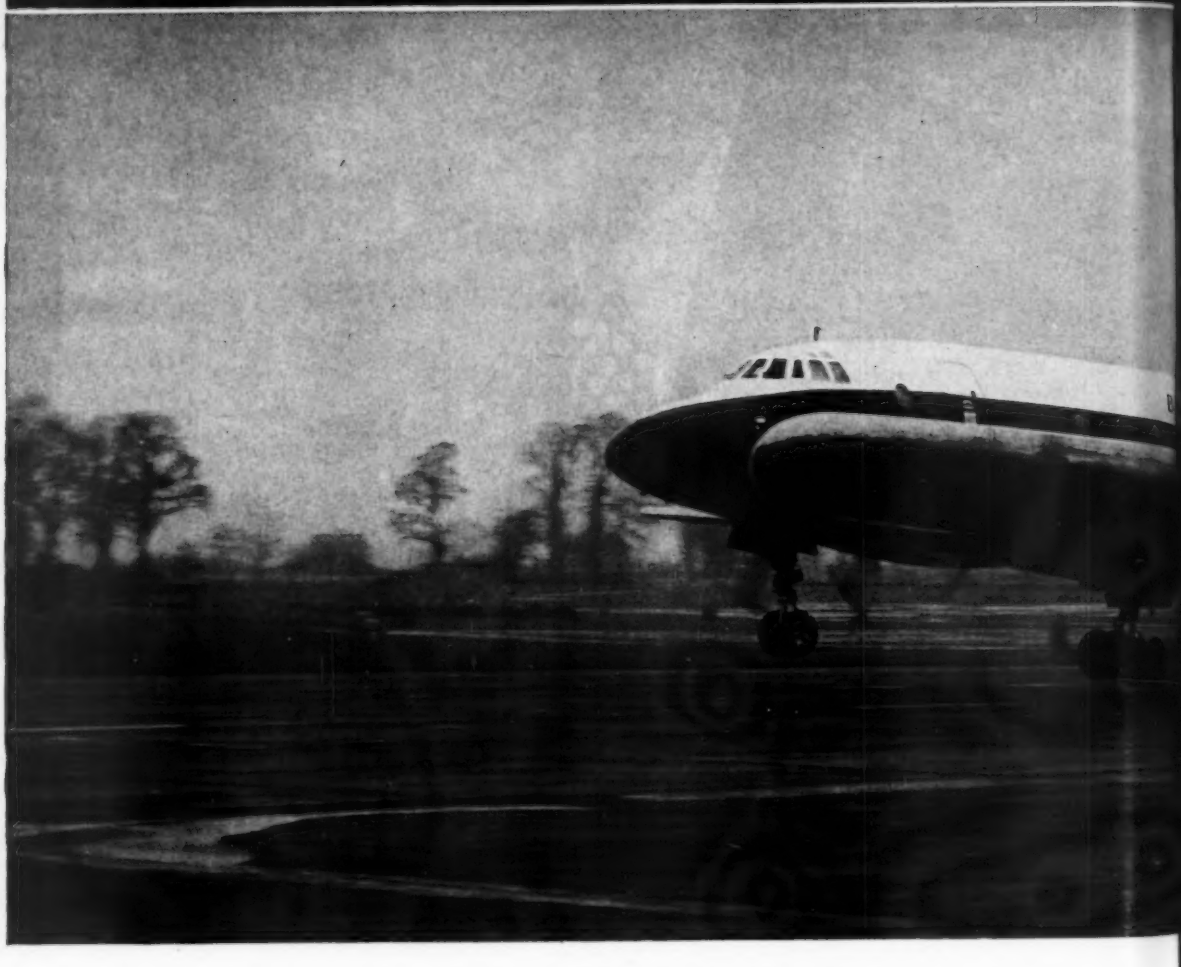
MORE ABOUT BRISTOL'S "WHISPERING GIANT

A new Britannia mark: non-stop..



In a dramatic demonstration of range and speed, the jet-prop Bristol Britannia recently set a new mark for airliner operation.

The "Whispering Giant" flew 5,100 air miles non-stop London to the Pacific Coast in 14 hrs. 40 mins. at an average speed of 350 m.p.h with 6½ tons payload.

LIVING UP to her worldwide reputation for great range and high speed, the Britannia flew this record-breaking flight with casual ease.

Passengers left London after breakfast and arrived in Vancouver for lunch . . . relaxed and refreshed after a completely restful and enjoyable ride.

For operators, this was a vivid, practical example of turbine travel capabilities. In particular it emphasizes again the profitability of Britannia operations. The flight was made with a payload equivalent to 58 first-class passengers and baggage. The Britannia landed with sufficient fuel for another 400 miles of flying.

World's largest, fastest, quietest jet-prop transport, the Britannia is the most versatile airliner flying today. Powered by four 4,120 h.p. Proteus engines, the

London-Vancouver, 14 hrs. 40 mins.

"Whispering Giant" uses standard runways and fits into existing air traffic patterns. She has been chosen by world operators for a wide variety of routes—from the longest trans-polar flights to short inter-city runs.

In a matter of months, Britannias will be flown between New York-Washington and New York-Miami by Northeast Airlines and between Mexico City-New York by Aeronaves de Mexico.

The same type of aircraft will also fly non-stop Atlantic routes for BOAC and El Al Israel Airlines, and trans-polar and trans-Pacific routes for Canadian Pacific.

World-wide recognition and demand:

Britannias are in service on BOAC routes spanning four continents and have been ordered by Aeronaves de Mexico, Canadian Pacific, Cubana de Aviacion, El Al Israel Airlines, Hunting-Clan Air Transport, Northeast Airlines, the Royal Air Force and the British Ministry of Supply.

BRISTOL

Britannia

Bristol Aircraft Limited • England

New Westinghouse J34 engine powers first Navy all-purpose jet trainer

North American Aviation has chosen the new version of a proven power plant for this first Navy all-purpose jet trainer. Designed as a complete pilot training system for operation from both land and carrier bases, the T2J-1 is capable of taking students from primary through advanced phases to carrier qualification.

Engineered and designed after Pearl Harbor, the J34 turbojet saw rugged service in Korea. Its early reputation for combat reliability and durability has now become almost legendary after more than two million hours of combat and operational flight time. It is less than half as vulnerable to foreign object damage as other engines. No wonder the Westinghouse J34 was selected to power this new all-purpose jet trainer!

Take advantage of the Westinghouse ability to engineer, design and produce equipment for the defense of America. Write to the Westinghouse Electric Corporation, P O Box 868, Pittsburgh 30, Pa.

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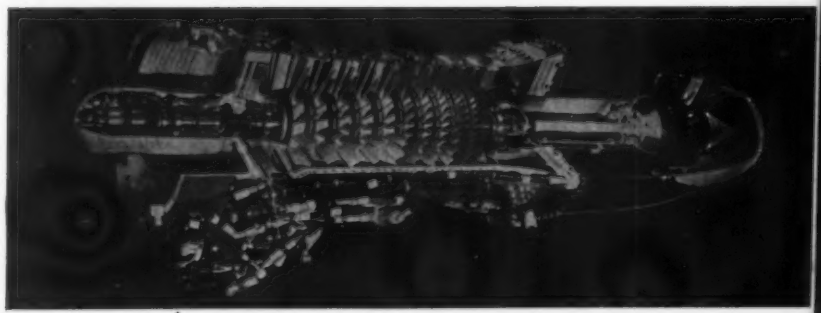

The Westinghouse J34-WE-46 will produce 3,400 pounds thrust to give the T2J-1 a level flight speed of 429 kt.

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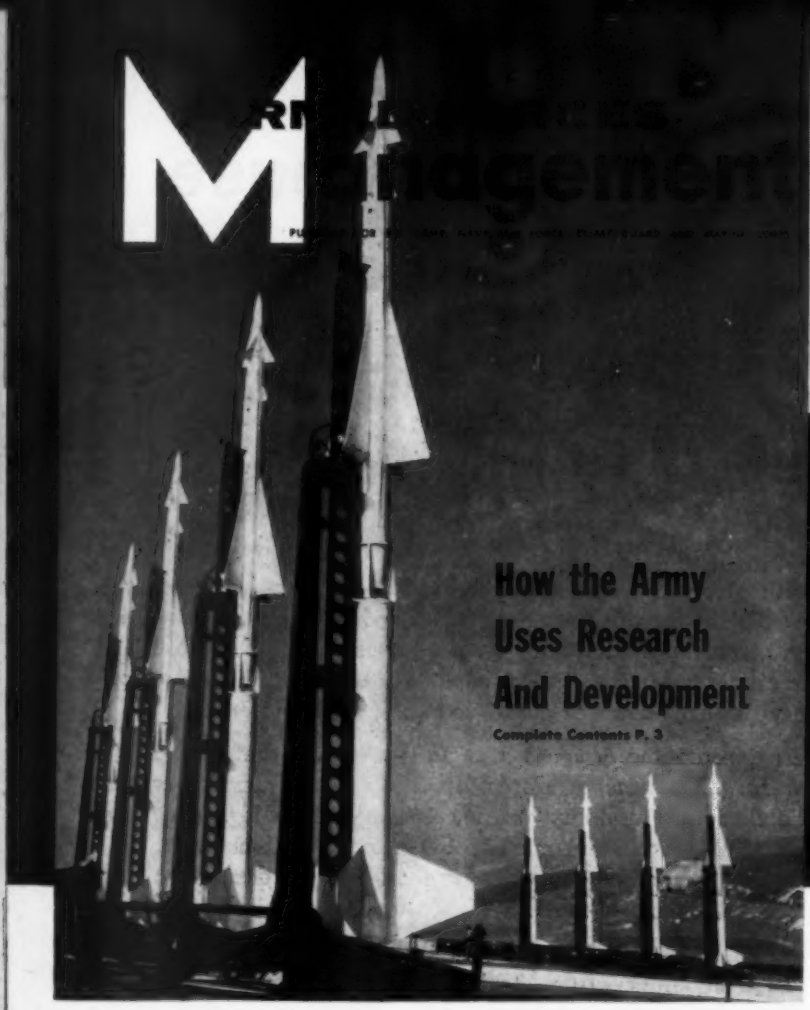

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* *Beginning with the September, 1957 issue.*

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LETTERS

Tire retreads

To the Editor:

Your most informative article "Jets to spark boom in tire retreading" by J. S. Murphy (AMERICAN AVIATION June 3, p. 57) was read with keen interest. We noted that you mentioned Delta Air Lines, one of the pioneers in the use of retreads. These retreads are the exclusive product of a newly developed and patented process owned by the Den-Nap Electric Mold Co., Macon, Ga.

Their licensee who produces these tires is the Gordy Tire Co., 151—14th St., N.W., Atlanta, Ga. I am sure that Mr. H. I. Gordy, president, would welcome the opportunity of showing and telling you about the equipment and its success in both the commercial and military fields. . . . *HOWARD ELLSWORTH SOMMER, Wolf Management Engineering Co., Chicago, Ill.*

Wants Reprints

To the Editor:

Your interesting article "Feedback from a servo valve" in the June 17 issue of AMERICAN (VIATION (p. 53) describing the growth and development of Moog Valve Co. has drawn many favorable comments from our engineering personnel. We have also received numerous requests for additional copies. We would like to request 850 reprints of your article at the earliest convenient date . . . *B. WAYNE SEVERANCE, personnel manager, Moog Valve Co., Inc., East Aurora, N.Y.*

Computers vs. pilots

To the Editor:

Sam Saint's column in your July 15 issue was very thought-provoking. But it's also a bit puzzling, because he raises a question about a new computer being developed, presumably on the assumption that all air traffic, in good weather or bad, will be ordered to do things that the pilots themselves may not agree with, or in which they may not even have a voice.

This comes as news to us, because the Curtis report never even suggested that the pilot's rights and his good judgment be replaced by an electronic computer. Our understanding of the Curtis report, and of the attitude of all staff members of the Curtis group from Mr. Curtis himself on down, has always been that the pilot himself must always remain the final authority, just as the captain of a ship does at sea.

While Sam can be understandably alarmed at such a threat to airline pilots, just imagine what that could mean to general aviation, which represents some 96% of all U.S. civil aircraft.

Needless to say, we'd join immediately in a fight to retain for the pilot the right to fly his plane as his best judgment tells him it should be flown. We're fascinated by computers, too—but not that fascinated. *MAX KARANT, Vice President, Aircraft Owners and Pilots Assn., Washington, D.C.*

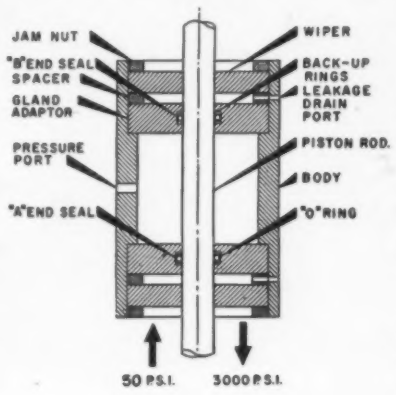
Editor's note: Sam Saint says . . . there will be more on this subject in a later column.

High-temperature actuators

To the Editor:

We have just completed reading your article entitled "USAF Backs New Competition in Hydraulics, Pneumatics" in the July 1 issue of AMERICAN AVIATION (p. 47). Your article was most interesting to us since we have been engaged, in part, in the development and manufacture of high-temperature Saginaw ball-screw assemblies for a number of years, and are aware of the present effort being made to extend the operating range of actuators up to 1,000°F.

Although we felt that your article was very fine, we were somewhat surprised at the almost complete absence of



any discussion relative to the use of electro-mechanical means of actuation for high temperature. We also felt it necessary to disagree with several statements which you made in this article.

We have been making the Saginaw ball-bearing screw for a considerable number of years, primarily for aircraft applications; although it has also found many uses in the machine tool, instrument, and other fields. . . Our experience with high temperature actuation goes back a good many years to the original development of reactor control rod actuators. Since this time we have made many screws for high temperature applications, and consider that we have been proven successful to a temperature of 500°F especially in the water-type reactor.

Recent test and development programs for high temperature ball-screw operation both here and at our customers' plants have resulted in the development of a Saginaw ball-screw which is able to transmit a force averaging 5,000 pounds at 600°F. At the present time, further development is required in order to attain the desired number of operating hours' life at this temperature range. However, the results to date certainly indicate, that this is far from an impossibility.

We have also proven by actual tests that operation of Saginaw ball-screws at temperatures ranging between 850°F and 1,100°F is possible. Our tests at the latter temperatures were under considerably lower loadings than that mentioned above, although life results were very good.

Because of the success we have had to date and a feeling on the part of a number of our customers that the ball-screw is the only answer for high-temperature operation on some applications, we will continue to run additional high temperature ball-screw testing.

We are of the opinion that you would possibly be interested in knowing that many companies doing development work in the high-temperature actuator field feel that the ball-screw had at least the equal if not better potential possibilities as compared to hydraulics for ultimate success in these temperature ranges. *J. V. SYRING, Ball Bearing Screw & Spline Operation, Saginaw Steering Gear, Saginaw, Mich.*

Liked editorial

To the Editor:

I have just finished reading your editorial in the July 1 issue of AMERICAN AVIATION ("CAB Inaction is Crippling the Industry"). I am sure that I express the sentiments of a great many people in our industry when I say that we are fortunate to have in you an expert who not only knows the facts, but is capable of speaking up flatly, emphatically, and persuasively. *WILLIS PLAYER, Vice President-Public Relations, Air Transport Assn., Washington, D. C.*

They liked Vandyk Articles

To the Editor:

I would like to take this opportunity to congratulate you for the article by Anthony Vandyk on SALA in your May 6 issue. I thought the article was excellent in every respect, and very well written. . . . We would like to translate this article into Spanish and print it in the local newspaper, and then make reprints of this to mail out to our Latin customers, if we may have your permission to do so.

Thanks again for a well written article. *ROBERT E. ANSON, General Manager, Servicios Aerotechnicos Latino Americanos, S.A.*

To the Editor:

Your splendid article by Anthony Vandyk on LACSA appearing in the May 20 issue of AMERICAN AVIATION was well written and very descriptive of the problems facing a small regional carrier in Latin America. I think you not only have done us a service in writing this article but you also focused attention on matters affecting other carriers in like circumstances. *ROBERT E. SMITH, General Manager, Lineas Aereas Costarricenses, S.A.*

Where Decca was invented

To the Editor:

Reference your article "ANDB Puts Damper on Decca Tests" (AMERICAN AVIATION, May 20, 1957, p. 24) We wish to correct the impression that "Decca wasn't invented in the United States." Actually it was invented in Los Angeles, Calif. by Harvey Schwarz and Bill O'Brien, two U.S. citizens.

Decca is now often unfortunately referred to as a British system because Great Britain was the first country to put it into use. As the U.S. licensee of Decca, we have re-engineered to U.S. components and specifications and are now manufacturing the equipment in North Hollywood, California, about twenty miles from where it was invented. *R. C. FULLER, General Manager, Bendix Aviation Corporation, Pacific Division.*

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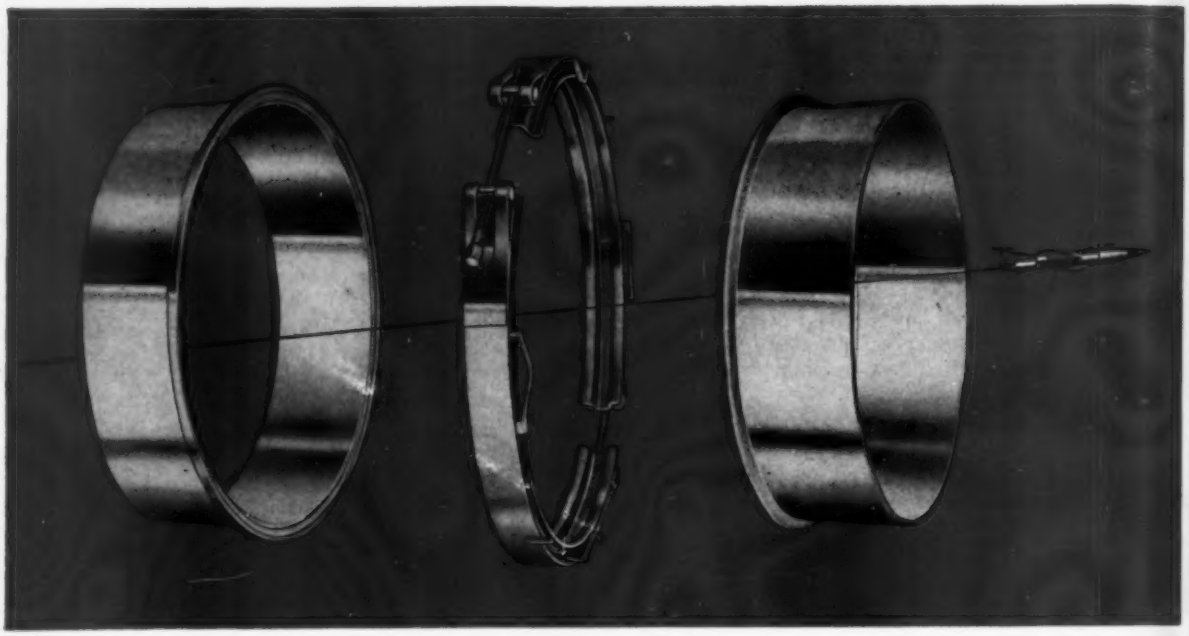

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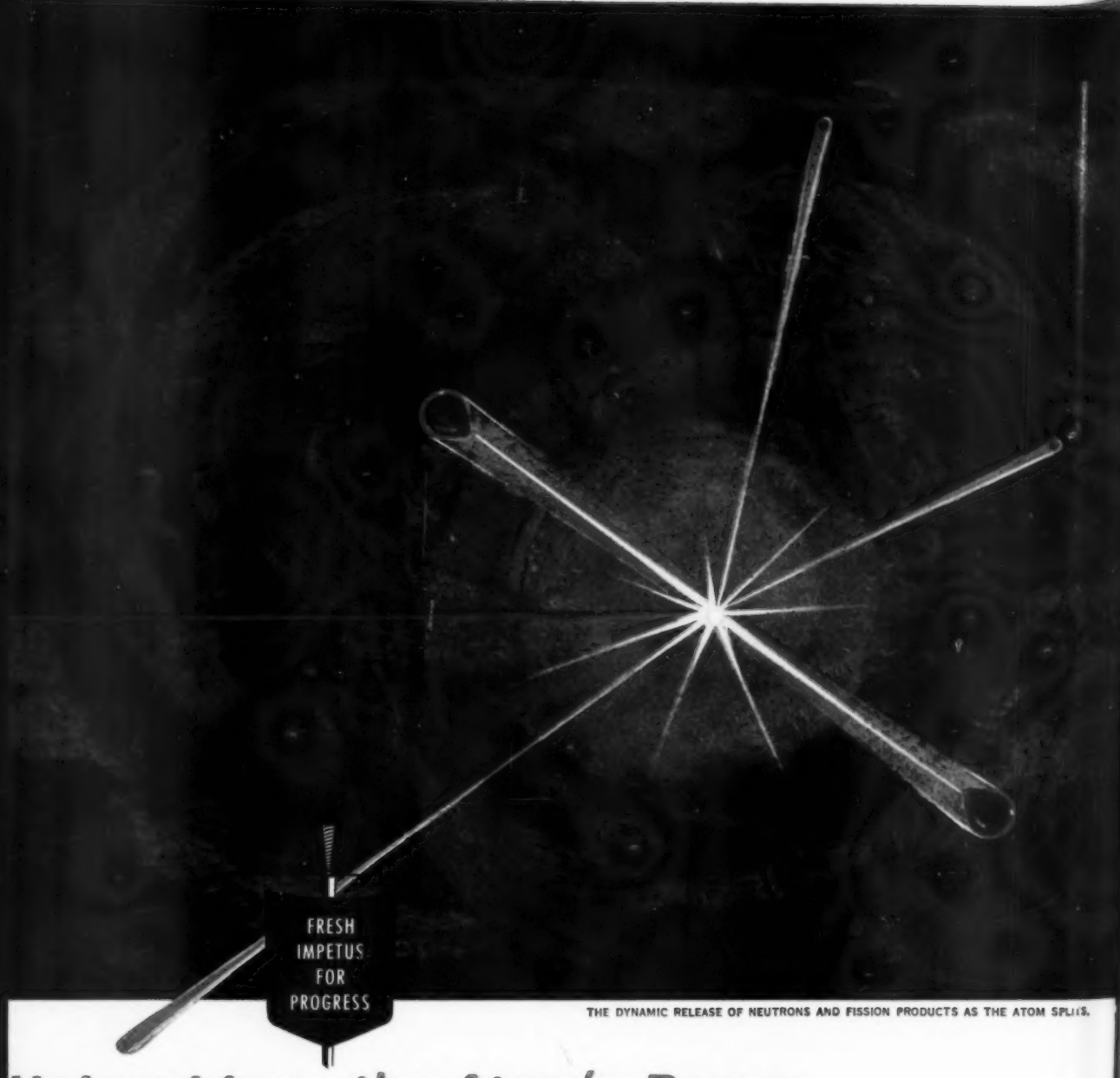

THE DYNAMIC RELEASE OF NEUTRONS AND FISSION PRODUCTS AS THE ATOM SPLITS.

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AIRTRENDS

Some reduction appears likely in the intercontinental ballistic missile program if USAF is to hold its fiscal 1958 spending to the $17.6 billion level ordered by Defense Secretary Wilson. The high-level Operations Coordinating Board, an arm of the National Security Council, reportedly was pondering an ICBM cutback last week. Any action to reduce the program will most likely involve a shake-out among the companies engaged in the guidance effort, with Atlas and Titan continuing as separate engine-airframe programs.

Another likely area for reduction is the aircraft nuclear propulsion program. USAF originally planned to spend $213 million on this in fiscal 1958, mainly on nuclear engine development by General Electric and Pratt & Whitney. Insiders figure one of these two projects may have to be dropped—if not the whole works.

Air Force determination to insulate the Strategic Air Command as far as possible from the Administration's spending reduction will have important consequences for contractors supplying equipment for the lower priority Tactical Air Command and Air Defense Command.

Further cuts in TAC appear particularly likely because of growing Army missile strength and a decision to put more reliance on NATO tactical units. With less business in sight for close support and tactical aircraft, companies principally engaged in producing such equipment will come under increasing pressure to merge with other companies or lose their prime contractor status.

Aluminum price increase will cost aircraft industry several million dollars. Conservative estimate is that industry pays about $200 million a year for aluminum products, mostly for high-cost alloys. This increases to about $208 million for the 300 million pounds that will be used in the next 12 months.

Adjournment fever and a combination of other events may push congressional investigation of the aircraft engine industry over into January. Officially, the Hebert Investigation Subcommittee says it will resume hearings as soon as other business is cleared. But the number of priority jobs the unit has set for itself leaves little room for a major probe before the end of this month, when members hope to be headed home. Chairman Hebert is noncommittal about the possibility of post-adjournment hearings.

A batch of USAF reserve nominations is being held up in the Senate Armed Services Committee because Sen. Margaret Chase Smith (R-Me.) is holding out for a pet promotion of her own which USAF hadn't recommended. Among those held up are actor Jimmy Stewart and J. B. Montgomery, former vp of American Airlines and now with General Electric. Both are colonels nominated for brigadier general. During hearings, Sen. Smith kept USAF officials on the hot seat.

Congress is expected to adopt Senate Finance Committee recommendations clamping strict curbs on the fast tax write-off program. The rules, which would be effective immediately, would exempt new and specialized items of military equipment bought by the Defense Dept. or Atomic Energy Commission. But general defense contractors will find it harder to get write-off approvals, committee spokesmen say. Bill calls for termination of the whole program on Dec. 31, 1959.

Fully reorganized, Greer Hydraulics is all set for an all-out revival with a big line of test equipment for jet transports, as well as many other items. Many heads rolled in the recent upheaval. Outlook for company is reported to be excellent.

DIGEST

R&D retrenchment, more unification urged as means of 'living within Defense spending ceiling'

by Lois C. Philmus

Solutions to the overall problem of living within the Defense spending ceiling and the more specialized dilemma of a constantly decreasing Air Force development program were offered at the 11th annual meeting of the Air Force Association in Washington. Two of the most significant addresses were delivered by:

Richard Horner, Assistant Air Force Secretary for R&D, who found the increasing use of multiple-source contracts as one of the best compromises for the conflict between a shrinking development program and the continued need for competitive methods of evaluation.

Rep. George Mahon (D-Tex.), chairman of the House Military Appropriations Subcommittee, who found the greatest area of promise for reducing Defense spending in stepped-up efforts toward increased unification of services and acceptance of new concepts.

Stressing the need for realism, Horner said that increased retrenchment in the R&D program will be necessary. "We face the years ahead with a decreasing portion of the Air Force dollar available for improving the quality of the Air Force with very little prospect of an increase in the number of dollars to offset this decreasing share."

The tool of materiel *selectivity* will have to extend deep into the development program, Horner asserted. As force structure goals are revised, there must be a a feedback in the selection of development projects, he pointed out.

"If you assume a balanced program to begin with," the Air Force official reasoned, "it is not practical to make all of a necessary saving from the procurement end of the program, for example, while retaining 'business as usual' in research and development, and still achieve a balanced program as an end position. Thus, we will have a reduction in the resources available to research and development.

"We cannot justify filling the shelves of our research and development 'Super Market' with components we cannot afford to integrate into developed weapon systems. Nor can we develop weapon systems which we cannot afford to produce, maintain, or operate."

USAF will be unable to utilize all the extensive government and manufacturing facilities, along with the highly trained technical organizations, he declared. "We are therefore understandably reluctant to create new facilities and new organizations. At the same time we have no intention of abandoning our competitive methods of evaluating technical proposals . . ."

Multiple source contracts will allow the Air Force to invite two or more companies to work on a project, with each providing the services for which it is best suited.

Horner revealed that general Air Force policy will be to leave to individual company judgment the details of inter-company working agreements. "We will not try to overmanage this effort by dictating the details of the relationship," he said.

Acknowledging the problems of protecting proprietary information, negotiating cross-licensing agreements and awarding follow-on procurement, Horner nevertheless found "increasing evidence that the aeronautical industry is willing to recognize the necessity of such arrangements and reach satisfactory company-to-company agreements."

Rep. Mahon, dealing with the broader aspects of Defense spending, charged that Defense Department has not yet fully faced up to the facts that many old reliable fundamentals of military science no longer appear valid and that missile developments are forcing a re-evaluation of the traditional roles and missions among the services.

More unification was labeled the No. 1 solution by Mahon. He called on the President to move immediately and aggressively in this field in time for active consideration of the fiscal 1959 budget. "We cannot afford the luxury of each service having the men and the weapons to fight the whole war," he declared. "A degree of unification never heretofore achieved in peacetime is mandatory. The time has come to tear down the costly iron curtain which separates the services."

Increasing the Defense budget, he declared, are excessive interservice rivalries, with the military requesting funds and programs they may not actually need. Only check is Congress' tendency to discount budget requests because of the obvious rivalries and duplication of effort generated, taking claims with "large grains of salt."

Mahon declared that the Defense secretary and his associates have a long way to go to get interservice problems of duplicating developments and missions settled and military effort in all services into a "coordinated team effort."

He urged that the Defense Department's Weapon Systems Evaluation Group, for which Congress voted considerable additional money in 1958, direct its efforts toward "challenging the entire concepts behind the assignment of roles and missions and the employment of specific weapons systems to carry out those missions."

"I mean by this," he said, "that such a group should evaluate the role of the super-carrier in modern atomic warfare, as well as the value of the manned bomber and the ballistic missile."

WSEG, he said, has had little impact on important decisions over the years of its existence. But, he declared,

Marine Corps evaluates C-130 aerial tanker

First flight of the aerial tanker version of the Lockheed C-130 military turboprop signaled the start of evaluation of two of the tanker models this month by the Marine Corps.

Designed specifically for the leathernecks, the C-130 tanker is equipped with pods attached to the wings, containing motor-driven reels and drogues for refueling fighter aircraft. Fuel is dispensed through wing tanks.

Test version carries two 506-gallon tanks in the fuselage, but production models will have at least a 6,000-gallon tank. Another advanced version of the C-130 reportedly will feature boundary layer control to provide better short-field performance.

"herein lies considerable hope toward finding a solution to our major military problems if this group does the job."

Neither Congress nor the public is going to stand for "skyrocketing" defense costs, Mahon warned. Solutions must be found and "found quickly" for the complex problems of military organization, assignment of roles and missions and weapons systems evaluation, he said. Only through greater unification, better management, and realization of new concepts coupled with immediate Administration action, he concluded, can we compress more defense into the same number of dollars.

CAB rejects airline bid for 6% fare increase

Domestic airlines, hard pressed by rising expenses, have been refused a 6% fare increase by the CAB, although one board member warned that the action may be "calamitous."

It was a stunning blow to the airlines, whose profit margins have been shrinking rapidly. On the same day that CAB acted, the Interstate Commerce Commission granted the railroads another freight rate increase that will boost the carriers' revenues by $442,800,000 a year.

The 4-1 CAB vote puts the airlines in a "critical financial position" and may prove "calamitous," said CAB Vice Chairman Chan Gurney, the only dissenter.

The majority claimed that on the basis of the record before it, the emergency relief requested by seven carriers is not justified. It promised that the general passenger fare investigation, interrupted by the current case, would be resumed promptly and processed on an expedited basis. The investigation will reach the board for decision sometime next year.

The Board's vote, announced only five days after the close of oral argument (see page 75), applied to tariffs filed by Braniff, Capital, Delta, Eastern, Northwest, TWA and United. American's request for an increase, filed much later than the others, was not covered by the vote. CAB has until Sept. 28 to act on the AA tariff, but it is not believed that the carrier will push its request.

In his dissent, Gurney, the senior and most experienced board member, said: "I thoroughly believe the requested increase . . . is mandatory . . . increased operating costs, lowering margins for legitimate return on investment make it impossible for the air industry to compete with other important industries for necessary capital . . .

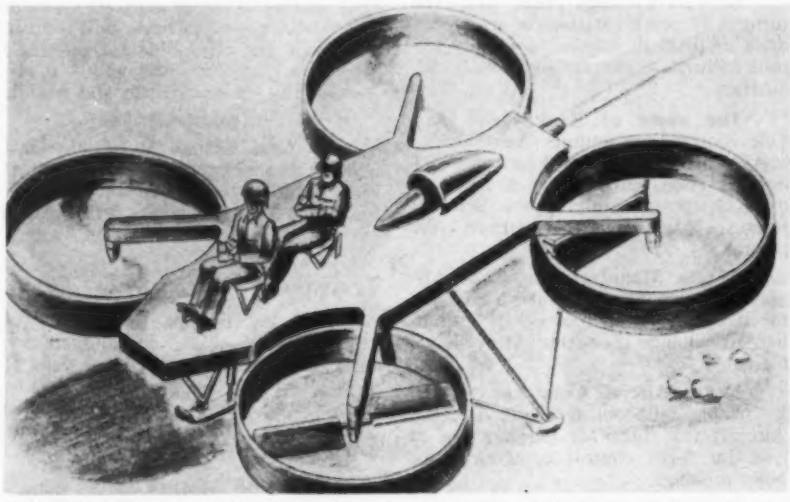
"The majority has not in my opinion met its responsibility; in fact, the overall need is so urgent, their decision may be calamitous to the industry, some parts of which may be damaged beyond repair because of further delay (conservatively estimated to take from eight to 12 months) in meeting this emergency problem head on."

Army orders three jeep test beds

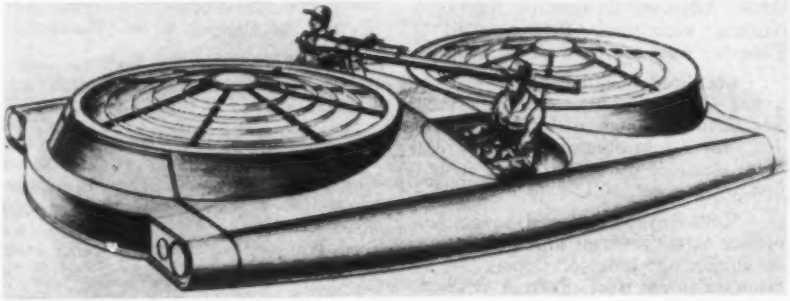
Army has awarded contracts totaling $1,702,637 for three types of ducted fan "aerial jeeps." Two of the models are two-ducted designs and the other is a four-ducted version.

Curtiss-Wright subsidiary Aerophysics Development Corp. will build two of the four-ducted versions on a $387,831 contract, Chrysler Corp will build a pair of two-ducted prototypes under a $661,441 award and Piasecki Helicopter Corp. will build two of a two-ducted type for $653,365.

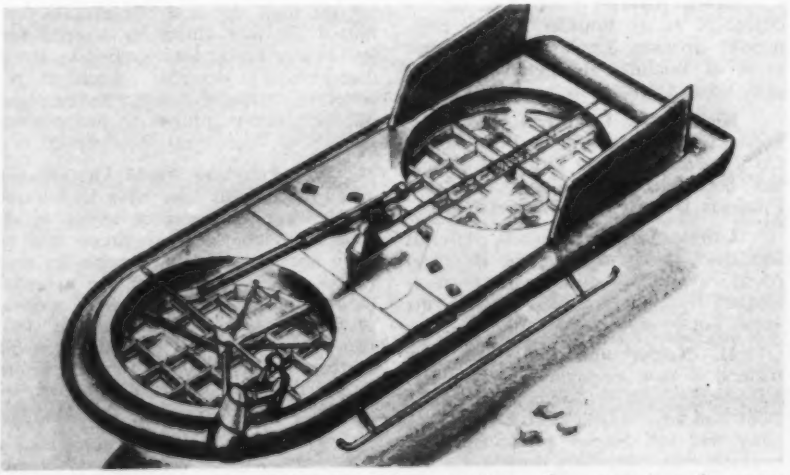
The firms will design, construct and develop the prototypes as general utility vehicles with the goal of combining the versatility of the conventional jeep with capabilities of hovering and flight.



AEROPHYSICS "Aerial Jeep" has fans at each corner of platform, carries two men. Engine appears to be turboshaft, mounted at rear center of platform.



CHRYSLER'S proposed vehicle has two fans in tandem. Crewmen are positioned at either side with recoilless rifle mounted on track between them.



PIASECKI'S jeep has pair of fans in tandem, recoilless rifle mounted at the center of the platform, drive pilot at left front, vertical fins on both sides aft.

BRIEFS

Manufacturing

Army will assume cognizance over the missile and small weapon systems facility being built by The Martin Co. at Orlando, Fla. It will be the first privately-owned aircraft industry plant to come under Army supervision.

Aircraft Castings Assn. has been formed by representatives of five foundries to promote expanded use of ferrous castings in aircraft and missiles industries.

The name of Radio-Electronics-Television Manufacturers Assn. (RETMA) will be changed to Electronics Industries Assn. effective upon approval of a charter revision by the State of Illinois. Membership approved the change.

Rheem Manufacturing Co.'s Aircraft Div. has been awarded a contract for design and construction of a combat surveillance drone for Army Signal Corps.

Kellett Aircraft Corp. has received a "sizable" subcontract from Douglas Aircraft Co., Inc., for manufacture of a major flight control component for Nike missiles.

RAdm. Wellington T. Hines has been appointed by President Eisenhower to serve as a member of the National Advisory Committee for Aeronautics, succeeding RAdm. Carl J. Pfingstag who has been reassigned.

Lockheed U-2s have been assigned to the 4028th Strategic Reconnaissance Squadron at Laughlin Air Force Base, Tex., for use in obtaining weather data from altitudes up to 55,000 ft. This is first assignment of U-2 to AF unit.

Rolls-Royce-developed sound suppressor-thrust reverser unit will be used on all Conway-powered Boeing 707 Jet Stratoliners on order. Pratt & Whitney-powered 707s will use Boeing-developed units.

Beech Aircraft Corp. laid off 23 engineers at its Boulder, Colo., engineering division. Similar cutbacks were made at Wichita, Herington and Liberal, Kan., facilities.

Richard A. Powley, formerly assistant general manager of Ford Motor Co.'s Aircraft Engine Div. at Chicago, has been elected president of Pesco Products Div. of Borg-Warner Corp.

Utility Aircraft Council, Aircraft Industries Association reports shipment of 513 1-10-place utility and executive aircraft by eight manufacturers during June. Total value was $8,188,000.

D. Napier and Son, Ltd., has formed a new company, Napier Engines, Inc., with headquarters at DuPont Building, Washington, D. C. Company will sell Napier products, make contacts with customers for overhaul of engines, subcontract overhaul and servicing activities, and distribute spares.

A. V. Roe Canada, Ltd., and General Precision Equipment Corp. have concluded an agreement providing that Canadian Applied Research will enter into manufacture and sale of a variety of GPE products in Canada, and GPE will manufacture and distribute Canadian Applied Research products in the U.S.

Convair is expanding its European Sales office at Geneva and George C. Prill, former assistant manager of commercial sales at San Diego, will head it. Office will be responsible for sales and support activities of 880 and 440 aircraft in European, African and Middle Eastern areas.

Lt. Gen. Patrick W. Timberlake, USAF (ret.), has been elected corporate vice president of Northrop Aircraft, Inc. He is former commander of Allied Air Forces in Southern Europe.

Transport

Ray W. Ireland has retired as vice president—traffic administration—of United Air Lines after more than 31 years with the company and predecessors. He is serving as a part-time consultant to Defense Air Transportation Administration.

New York Airways has introduced float-equipped Sikorsky S-58 helicopters. The 12-passenger rotorcraft will fly 30 flights daily between metropolitan airports and the heliport at West 30th St. and the Hudson River, Manhattan.

Todd G. Cole has been promoted to vice president—administration and finance, Delta Air Lines.

Transocean Air Lines leased two 92-passenger Lockheed 1049H Super Constellations and put them on its supplemental service between the west coast and Hawaii. One plane was leased from Air Finance Corp., the other from Dollar Associates.

CAB said the probable cause of a TWA Martin 4-0-4 accident at Pittsburgh on June 7, 1956, was "that during the final approach the captain permitted the first officer to descend too low before power was applied to arrest the aircraft's descent." Accident resulted in extensive damage to the plane but only minor injuries to two passengers.

Pan American World Airways and The Flying Tiger Line have terminated a proposed arrangement under which a separate charter corporation was to have been established. Companies said it was originally thought the arrangement could gain government approval in time for the 1957 transatlantic summer season but "this proved not to be the case." Therefore, no purpose would be served by pursuing the matter further at this time, they added.

The Texas Company negotiated a two-year contract with Trans-Canada Air Lines to supply 4,083,000 gallons of JP-4 turbine aircraft engine fuel at New York International Airport in 1958 and 4,444,000 gallons in 1959.

Pan American World Airways was awarded a $53,509,304 contract for additional work and increase in funds for the Air Force Missile Test Center at Patrick AFB, Fla.

The Flying Tiger Line and Riddle Airlines established a joint tariff to cover deferred airfreight service between the west coast and southeastern areas of the U.S.

Financial

Cessna Aircraft Co. reports sales for the third quarter of its fiscal year of $18,668,000, compared with $17,234,000 for the second quarter. Earnings after taxes were $1,146,633 or $1.49 per share, up from $852,298 or $1.12 per share for the previous quarter.

Vertol Aircraft Corp. reports sales of $20,203,795 for the three months ended June 30 and $41,952,442 for the six months ending the same day. Earnings were $588,358 and $1,322,079, respectively, for those periods.

McDonnell Aircraft Corp.'s board of directors has voted to recommend to shareholders at the annual meeting August 22 that the authorized number of shares of $5 par value common stock be increased from 1.7 million to 2 million. At present there are 1,525,086 shares outstanding.

North American Aviation reports net earnings for the nine months ending June 30 of $26,604,000 equal to $3.23 per share, compared with $22,322,852 or $2.79 a share for the comparable period a year ago. Income amounted to $937,095,265 for the period.

Delta Air Lines earned $2,622,000 net after taxes for the 12 months ending June 30, compared with a net of $3,369,196 for the year before. Per-share earnings were $2.34 and $3.38 for the two years. Operating revenues increased 18% during the past year.

Menasco Manufacturing Co. reports net sales of $23,723,222 for the year ended June 30, compared with $18,186,318 last year. Earnings were $1,023,348 or 78¢ a share, compared with year ago's $933,533 or 70¢ a share.

Eastern Air Lines reports a net operating profit of $3,632,000 or $1.27 a share, for the first six months of 1957, compared with a net of $7,521,000 or $2.71 a share, a year ago. Operating expenses went from $119,002,374 last year to $138,206,000 this year.

Republic Aviation Corp. reports a net income after taxes of $3,665,749 or $2.29 a share on sales of $168,374,970 for the six months ending June 30. This compares with a net of $3,504,651 or $2.38 a share on sales of $163,171,859 in the same period a year ago.

NEW WEAPON, NEW CONCEPT

An important new weapon for a new U. S. Army concept is now being delivered in quantity by Martin-Orlando. This is LACROSSE, a field artillery guided missile, developed to implement the combat concept of the Pentomic Army... a "fighting" Army consisting of self-sufficient highly mobile battle groups. LACROSSE will provide these battle groups with the shockpower of extraordinary speed, mobility and accuracy in heavy armament support of their operations. LACROSSE is the first generation of an entirely new kind of general purpose weapon. All of its components, consisting of the missile mounted on a standard Army truck and a guidance system, can be airlifted to advance areas. The missile is fired in the general direction of the target—without target data at the launching site. Its pinpoint accuracy is controlled by a forward observer. The Martin Company, with more than 10 years of design, production and operational experience in guided missiles, today stands as a leader in this important field.

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BALTIMORE DENVER ORLANDO

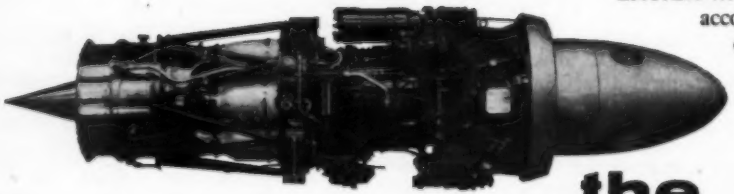
Larger payloads – Longer hauls with ELAND

Years of progressive research on compressor and turbine design have produced the advanced aero-engine techniques which give Napier engines long life, high performance and low operating costs.

But the case for the Eland is not based on ground test performance alone. These facts and figures are taken from the flight performance of a typical medium-haul aircraft, the Convair 340, converted from piston to Eland.

FASTER AND FURTHER Larger payloads . . . longer distances. With the Eland the Convair operates at its design all-up weight of 53,200 lb. as against 47,000 lb. with piston engines, and can carry its maximum payload of 12,880 lb. a distance of 1,220 miles as against 290 miles, with an increase of cruising speed up to 55 m.p.h.

EASIER MAINTENANCE With engine maintenance accounting for some 20% of an airline's direct operating costs, the Eland's single-spool design



the era of the

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assumes a special importance. As a result of developing the highest stage-loadings ever achieved, it has been possible to avoid the complexities of the twin-spool. Reduction gear assembly, compressor assembly, main support plate and combustion chamber assembly and turbine unit are designed as independent power sections each of which can be removed quickly and replaced as required. The metering control unit is a self-contained rig-tested assembly which can be replaced with only minor adjustments to the engine link work. This unit construction allows maximum life to be obtained from each component with consequent savings in overhaul costs.

GREATER SAFETY Because of its simplicity the Eland is inherently safe. There is no surge and in the event of any mechanical failure between engine and gearbox the overspeed governor continues to be driven by the engine, thus preventing any overspeeding. The oil system pumps (driven by the propeller) continue to supply oil to operate the autopitch coarsening.

LONGER FUTURE It is now generally admitted that the recent decision of some of the world's leading airlines to invest in turbo-prop is in fact the logical decision that will have to be made sooner or later by all middle-haul airlines. Of turbo-prop investments the Eland will pay among the safest dividends. The Eland conversion means virtually *a new aircraft* at one third of the price and it is a relatively simple and speedy operation to put the new higher-revenue-earning aircraft back into operation in the minimum of time.

HIGHER PROFITS It has been estimated that a Convair 340 conversion operating over stage lengths of 200 miles with a utilisation of 3,000 hours per year and a load factor of only 65% would show a profit increase of $100,800 per year over the piston engine version. On routes with stage lengths of 800 miles a fleet of 20 Eland Convairs in similar conditions would show more than $3,000,000 extra profit annually.

The trend of the efficient airline is towards the propeller turbine; the right decision now will mean high operational success in the next decade.

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WHEN—WHERE

AUGUST

International Ignition Conference, sponsored by Bendix Scintilla Div., Sidney, N.Y., Aug. 20-22.

Western Electronic Show and Convention, Cow Palace, San Francisco, Aug. 20-23.

National Flying Farmers Assn., annual convention, Municipal Airport, Wichita, Aug. 25-29.

Experimental Aircraft Assn., annual Fly-in and convention, Curtiss-Wright Airport, Milwaukee, Aug. 30-Sept. 1.

SEPTEMBER

Royal Aeronautical Society and IAS 6th International Aeronautical Conference. Folkstone & London, Sept. 1-15.

SBAC annual air show, Farnborough, England, Sept. 2-8.

Annual OX5 Club convention, Hotel Phillips, Kansas City, Sept. 7.

Aircraft Div. of the American Society for Quality Control, annual conference, Mark Hopkins Hotel, San Francisco, Sept. 9-10.

USAF world-wide conference of flying safety officers, Arrowhead Springs Hotel, San Bernardino, Calif., Sept. 9-13.

IATA annual general meeting, Madrid, Sept. 9-14.

USAF-aircraft industry conference on safety eduction, Santa Barbara, Calif., Sept. 17-19.

Pratt & Whitney operations/maintenance forum, Airwork Corp., Millville, N. J., Sept. 19-20.

ASME fall meeting, Hotel Statler, Hartford, Conn., Sept. 23-25.

Composite and joint meeting of IATA traffic conference, Miami, Sept. 24.

Aviation Spark Plug & Ignition Conference, Secor Hotel, Toledo, Sept. 24-26.

SAE Aeronautic meeting, Aircraft Production forum and Aircraft Engineering Display, Ambassador Hotel, Los Angeles, Sept. 30-Oct. 5.

OCTOBER

National Airports Conference, University of Oklahoma, Norman, Oct. 2-4.

National Business Aircraft Assn., 10th meeting and forum, Denver, Oct. 2-4.

International Northwest Aviation Council, annual convention, Palliser Hotel, Calgary, Canada, Oct. 6-8.

National Electronics Conference and **Forum** on electrical research, development and application, Chicago, Oct. 7-9.

Triennial Inspection of the NACA Lewis Propulsion Lab., Cleveland, Oct. 7-10.

Annual Airport Development and Operations Conference sponsored by N. Y. State Bureau of Aviation, Onondaga Hotel, Syracuse, Oct. 8.

International Union of Aviation Insurers, annual general meeting, Amsterdam, Holland, Oct. 8-11.

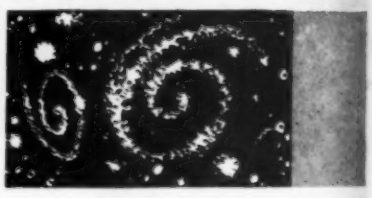
Society for Experimental Stress Analysis, national fall convention, El Cortez Hotel, San Diego, Oct. 9-11.

National Noise Abatement Symposium, Armour Research Foundation, Sherman Hotel, Chicago, Oct. 10-11.

ASTA convention and world travel congress, Madrid, Spain, Oct. 13-20.

National Assn. of State Aviation Officials, annual meeting, Sun Valley, Ida., Oct. 16-18.

LOOKING TO THE FUTURE!



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Aircraft Corporation

SPOTLIGHT

Fairchild is building a new mockup of its M-185 jet utility transport which will incorporate changes based on windtunnel tests. New mockup also will feature a roomier cabin, other interior changes. Company has invested about $1 million in the development and has no plans to abandon the project, despite persistent rumors. Fairchild is moving cautiously and will not invest in a prototype until it is satisfied with mockup design.

Second Cessna 620 prototype is nearing completion at Wichita. Although no sales have been announced, company expects to deliver its first production model within a year. The four-engine executive plane will sell for $370,000, plus accessories. First production model will roll out in March.

Cornell Aeronautical Lab researchers estimate that a 50-passenger STOL aircraft or helicopter would have a direct operating cost of 16 cents per available seat-mile over a 25-mile block, 7 cents over 100 miles. On the other hand, a 294-passenger high-density jet could operate at 1.1 cents per seat-mile over a 400-mile range and 1.45 cents over 200 miles.

Latest schedule for the Fairchild F-27 prototype calls for rollout in late December, first flight in January. First production aircraft will be delivered in March.

The Chance Vought F8U-1 Crusader that set a new transcontinental record recently was in combat-ready shape when it reached the East Coast and could have gone into immediate carrier operation. But Pratt & Whitney reps wanted to inspect the engine turbine blades after the 2,460-mile flight, so the plane was not assigned to current carrier trials.

USAF probably will support a program whereby the Italian company Aerfer will build 10 Leone mixed-power interceptors. Three would have de Havilland Gyron Juniors as their jet powerplants, seven would get the Bristol Orpheus. Rocket motors would be DH Spectres.

Lockheed Electra turboprop transport will be lined with honeycomb-type, resiliently mounted panels to block out aerodynamic noise. Fiberglas filler under the aluminum surfaces of the panel will absorb vibration from outer surface, which vibrates with airplane structure, to inner surface.

USAF experts feel that the efficiency of chemical rockets can be increased significantly within the next 10 years. Application of such a chemical propulsion system could reduce size of ballistic missiles appreciably. While present chemical propulsion systems have proved their suitability, nature of the systems is such that the missiles would have to be excessively large.

Average age for civilian flight instructors at Southern Airways School, Air Force contract primary training base at Bainbridge, Ga., is 35. Of the 140 instructors, 98% are married, 87% are ex-military and all have flown in jets. Cumulative years of instruction is 560.

Prototype of SIPA 1100 twin-engine ground support aircraft is expected to fly this fall. French company has a contract to build 10.

Handley Page Victor B2 and Avro's Vulcan 2 bombers will have engines developing nearly 20,000 lbs. thrust each. Victor will get the Rolls-Royce R.Co.11 Conway, while the Vulcan will use the Bristol Olympus B.01.6.

Fokker Industria Aeronautica has turned over the first of an order of 95 S-11 trainers to the Brazilian Air Force. About 15 have come off the Brazilian company's line to date. Company also has orders for 50 S-12s and 45 jet-powered S-14s. It also plans to build the F-27 turboprop transport.

Avco today

Avco's Crosley builds the "trigger finger" for SAC

Reliable protection is a *must* for Boeing's giant B-52, operational weapon of the Strategic Air Command. A Crosley-manufactured MD-9 fire control system—with dual radar and multi-weapon turret—provides deadly and almost completely automatic protection for the B-52.

This newest "stinger" is one of a long list of modern bomber defense systems produced by Crosley. And, looking to the future, Crosley scientists are constantly developing still finer protection for the aircraft of tomorrow.

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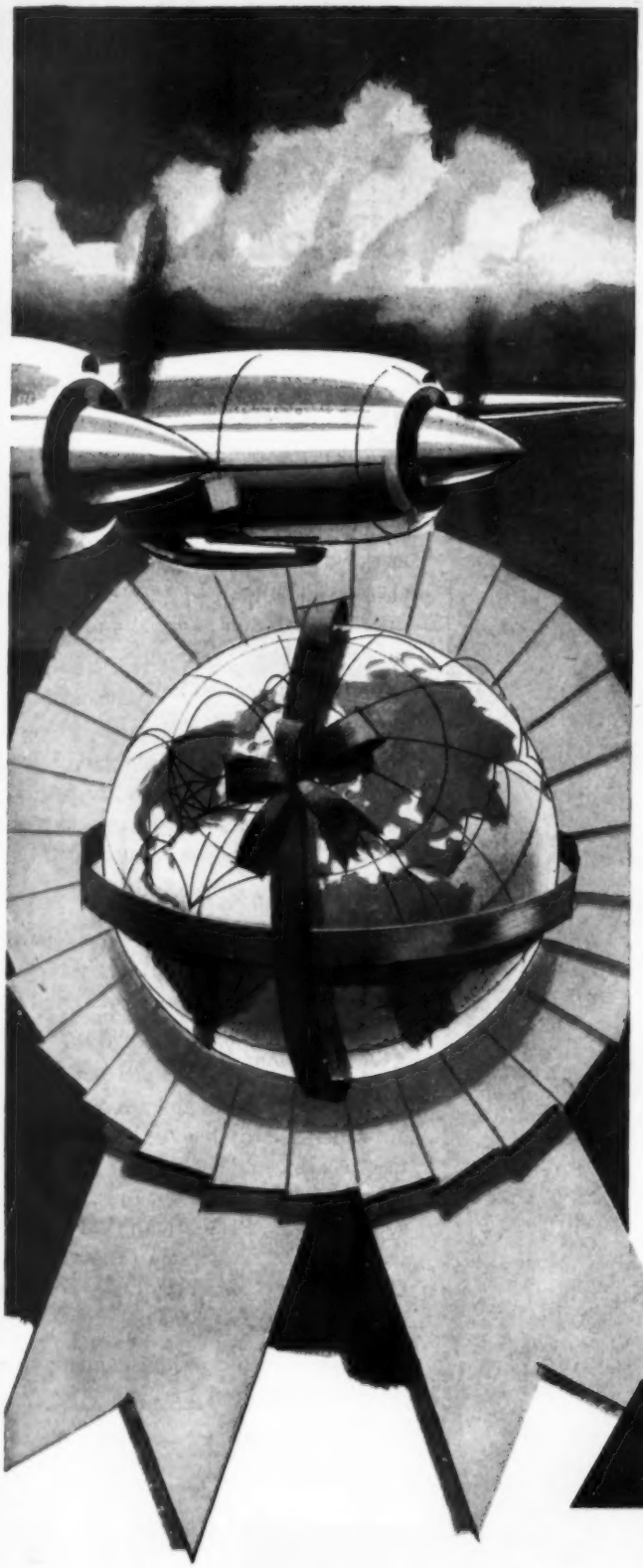

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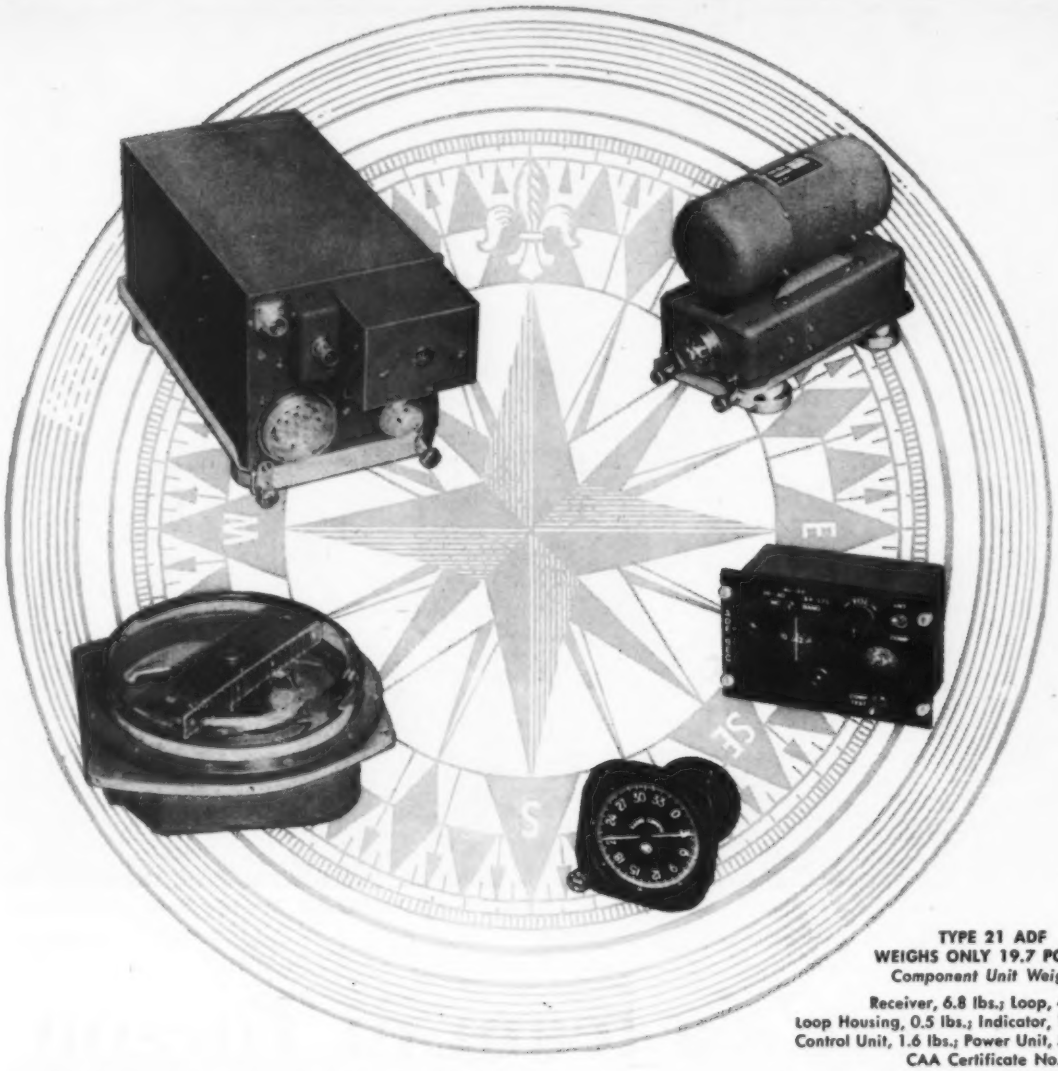

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There's a team in Tucson worth knowing about!

Big Bob Schmidt.and Shell, working together at Tucson, Arizona, Airport have increased aviation fuel sales fivefold since 1948!

Seems everything's big at the Tucson Airport—Big Bob, big sales . . . and big plans that are underway to extend the 12,000-foot runway to 15,000 feet, making it the longest in the world!

"One of the things that attracted us to Shell," says Bob, "was the company's reputation for helping dealers grow. We knew there must be good reasons for it. We soon found out. Giving engineering and other specialized assistance to help dealers build for the future is one secret of Shell's position as an aviation supplier.

"For example, when we needed more bulk space, Shell engineers designed and supervised the construction of storage facilities.

What's more, Shell's technical representative is always here when we need him, making our job of keeping our customers satisfied a lot easier."

And at Tucson, customers *are* satisfied. Pilots know that a Tucson stopover means a lot more than sunny weather. Big Bob gets them in and out again—fast! He delivers the kind of service they need for on-schedule take-offs every time.

Responsibilities fall on Bob Schmidt when he's *away* from the airport too. Bob is president of the National Foundation for Asthmatic Children, president of the American Association of Airport Executives, a director of the Tucson Metropolitan YMCA, and chairman of the Y's Southside Branch.

Shell is constantly on the watch for men who can build careers to match that of Bob Schmidt.

Corporate plane taxies past control tower on way to spacious parking ramps. New operations' building and ten-story tower are under construction.

Big Bob and Shell representative "Nebby" Nebeker stand near bulk storage tanks discussing plans for still further expansion of airport facilities.

Speedy turnabout service is provided for huge airliners landing at Tucson. Efficiency results in on-time take-offs.

It pays to be a Shell Aviation Dealer

—and the Shell office nearest you will be glad to show you why

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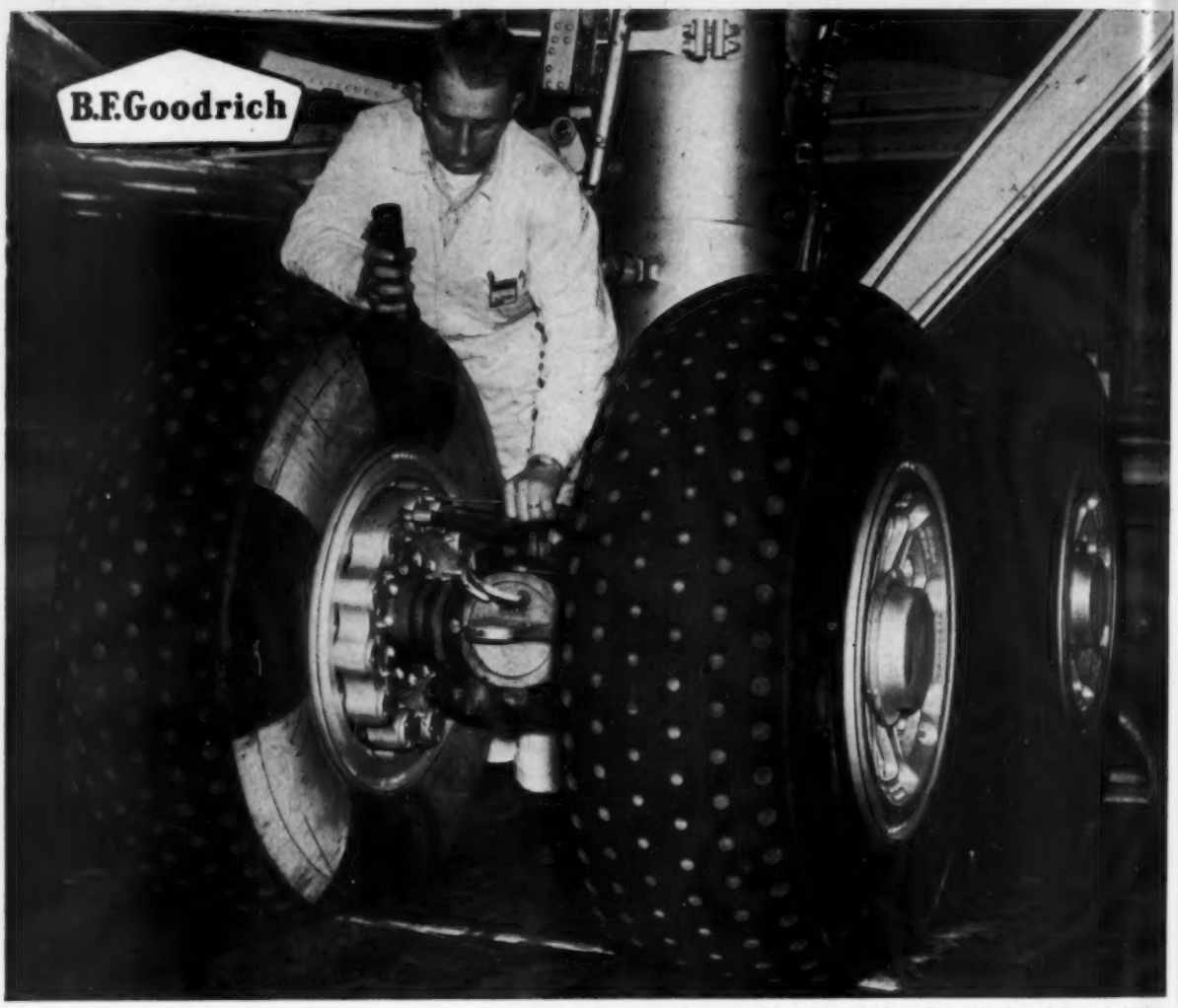

Photo shows complete assembly of BFG Disk Brakes, Wheels and Dimpled Tires

Why Boeing chose B. F. Goodrich Disk Brakes for the 707

AFTER WEEKS of comparative flight tests, Boeing decided on B.F.Goodrich Disk Brakes and Wheels for their high-production 707-320, the Intercontinental. In addition, these same wheels and brakes will be original equipment on many of their popular 707-120's.

Boeing's tests proved again that B.F.Goodrich Disk Brakes have higher capacity for faster, chatter-free stops than any other brakes on the market today. That's because B.F.Goodrich brakes are thermally balanced—they have proper distribution of heat sink masses for high efficiency. In addition, special BFG sintered metal linings reduce torque variations to a minimum at all speeds and energy conditions. Slow, even wear and two-way automatic adjustment reduce maintenance and keep brakes operating uniformily at all times.

B.F.Goodrich Disk Brakes and Wheels have already been selected as basic equipment for all types of new aircraft—jet fighters and trainers, propjet and jet airliners. It's further proof that advanced BFG design is meeting the unusual braking requirements demanded by aircraft of the future.

We invite you and your designers to discuss technical details with us. We know we can help solve your problems.

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AUGUST 12, 1957—VOL. 21, NO. 6

AMERICAN AVIATION

WORLD'S LARGEST AVIATION PUBLISHERS

Howard Hughes . . .

$500-million equipment power play to push TWA into jet age world transport leadership

by Wayne W. Parrish

BIG THINGS are beginning to happen to Trans World Airlines. The impact will be sharply felt both domestically and internationally.

Multi-millionaire Howard Hughes, whose Hughes Tool Co. owns 74% of the airline, has apparently made a big decision. It is this decision, more than day-to-day TWA activities, that comprises the big aviation news story of 1957.

The decision? It sounds simple but it has plenty of depth. It is that Howard Hughes has decided to make TWA his No. 1 activity and interest. He is in the process of making a $500-million power play for the jet transport era.

Currently in the news is the exclusive story printed Aug. 2 by *American Aviation Daily* that Hughes has made an offer to buy 30 turboprop Bristol Britannias providing he can get early delivery. It is one of the most interesting deals in airline history because Bristol, in its eagerness to sell Britannias to TWA, had to go to British Overseas Airways Corp. and try to get a release from BOAC of 19 Britannias which that government-owned airline had on order.

Release of 19 planes by equipment-short BOAC would mean an even greater shortage. So BOAC in turn has asked Douglas Aircraft Co. for prices and delivery dates on 15 DC-7Cs. BOAC has ten of this model already in operation. It likes the DC-7C and this type fits well into BOAC's long-haul intercontinental routes.

A vital part of this two-country four-party negotiation is that TWA must operate the Britannias only within its domestic U.S. route pattern. Cost of the Britannias is estimated at about $150 million. Cost of 15 DC-7Cs for BOAC would run about $50 million if the deal goes through.

In addition to the 30 Britannias—and Hughes has flown this airplane in Canada in recent weeks—he has been dickering for 22 Vickers Viscounts. Whether the Bristol deal nudges out the Vickers fleet, or merely supplements it, was not known at press time.

Interest in TWA sporadic

Now back to the main story of what is happening to TWA.

For most of the decade since Hughes took over solid and unchal-

HOWARD HUGHES

lenged control of TWA, his interest in the airline has been sporadic. Sort of on-and-off with long lapses of apparently minor concern. He had much bigger enterprises on his mind. Hughes Tool Co., Hughes Aircraft Co., Hollywood movie ventures, and many other items, took his major time and interest. TWA lagged down the line.

TWA not only lagged in attention from Hughes, but TWA began slipping competitively in the U.S. and later began getting some tough and telling competition from Pan American on the North Atlantic. TWA was short of equipment. It was no longer fastest with the bestest but was a me-too airline that had to go heavily into coach business when the first-class passengers moved to American and United. On the North Atlantic Pan American slapped on batches of new equipment to bracket TWA out of both London and Paris.

This year TWA is putting 25 Lockheed 1649 Jetstreams into service. It is operating on time, it has improved its passenger service and it has picked up a lot of steam since hard-driving Carter Burgess took over the presidency.

But at some time within the past six months Howard Hughes decided to move TWA to the absolute top of the list of his personal interests. And the show ought to be good for the future. It will be a big show, if Hughes holds to his present course.

The big jet race is on. World-wide. Jet airplanes cost a lot of money—$5 million a crack. Not many airlines are well heeled. Not many have unlimited credit. All too many are finding they have almost no credit. According to apparently reliable sources Hughes figured that now is the time to out-equip everybody else. He couldn't do this unless he concentrated on TWA—and this he is doing.

Money? Only Hughes and very few of his associates (he has no intimates) know the story here. But he must see his way clear financially or he wouldn't be making so many bold moves and so many tangible commitments. In all likelihood he will have to do some radical juggling of his various empires. The

BOAC statement on Hughes report

British Overseas Airways Corp. has issued the following statement in connection with Howard Hughes' efforts to buy Bristol Britannias for TWA:

"Recently Bristol Aeroplane Co. informed us Howard Hughes was interested in the Britannia, but the report that we have reached an agreement with that company to release Britannias on order for us is incorrect.

"We are now eagerly awaiting delivery of the 18 Britannia 312 long-range aircraft which we have had on order for many years and which we intend to use on our dollar-earning North Atlantic routes as soon as it is possible for us to introduce them into service. Moreover, we believe it is highly important that the British airline should be the first airline in the world to operate these new all-British turbo-propeller aircraft.

"If it were felt in the highest quarters that it was in the national interest that we should relinquish delivery of some early Britannia 312s, BOAC itself would suffer a serious setback to its plans for recapturing a substantial part of the traffic on these important dollar routes and would have to consider the acquisition of replacement aircraft."

bald truth is that Hughes can lay out the necessary stake for TWA—but he's going to have to put everything he's got into it.

One mystery is his current business management. Early this year Hughes came to a parting of the ways with his long-time No. 1 business counsel, Noah Dietrich, who has been with Hughes since the latter's father died.

The stories about the break-up are numerous but the one that makes the most sense is that one day when Hughes was putting on the pressure, Dietrich just up and walked out. Quit for good. But this parting has left a sizeable gap in the Hughes business management.

How big is the Hughes commitment for TWA? Figure it out. There are 33 Boeing 707 turbojets and 30 Convair 880 turbojets now on order for delivery starting respectively in 1959 and 1960. These two orders alone total about $320,000,000 with spares included. The Britannias amount to another $150 million if the deal goes through. The 22 Viscounts add another load.

All in all it looks as if Hughes has decided that a $500-million equipment program is in order. That's a lot of dough—more by far than most airlines could dream of raising.

The key year is 1960. By that time the jets will be rolling out and ready for use. Meantime, if he can get 30 Britannias quickly—within the next six to eight months—he will have a major jump on his competitors domestically for the turboprop market. The Britannia is billed as "The Whispering Giant" and undoubtedly has sales appeal. If he gets the Viscounts, they have plenty of sales appeal, too.

Hughes has been living in the Ritz Carlton Hotel in Montreal for the past several months. He's been in closer touch with TWA offices than for a long time. If he decides to visit the main TWA offices at 380 Madison Avenue, it will be his first visit to New York City in eight or nine years. After he finished flying the Britannia recently he had a group of top TWA officials fly to Montreal to look over the airplane. Prior to that Hughes had done a lot of flying in the Viscount, mostly landings and takeoffs.

An important angle not to overlook in the vast equipment program is Hughes' long ambition to operate a round-the-world airline. This year TWA will extend its route from Ceylon to Manila where it connects with Northwest. It will also open a polar route from San Francisco to Europe.

Some years ago Hughes made a pitch (unsuccessful) to purchase the Pacific routes of Northwest but if he is unable to buy a route or to persuade the CAB to give him one to connect Manila with San Francisco, he could probably work out an interchange agreement with NWA to provide through-plane service around the world.

Whatever happens, this much is certain: Howard Hughes and TWA will be in the limelight from now on for quite a spell. The airlines of the world will be well aware of their presence. A power battle using $5-million jet units for ammunition is in the making and the competition is going to get rough.

The Hughes' Scoreboard

1957—A fleet of 25 Lockheed 1649 Jetstreams put into service.

1957-1958—If negotiations are completed, delivery of fleet of 30 turboprop Britannias and 22 turboprop Vickers Viscounts.

1959—Delivery begins on 33 Boeing 707 turbojets.

1960—Delivery begins on 30 Convair 880 turbojets.

Definite commitments total $320 million. Under negotiation is another $170 million in equipment. Total definite and under consideration in excess of $500 million.

Douglas sees A3D, A4D output through 1960

The Navy, in the future as in the past, is apparently depending upon the El Segundo Division of Douglas Aircraft to supply it with a good portion of the service's attack aircraft.

Edward H. Heinemann, chief engineer of the division, told a meeting of the El Segundo Management Club that there are a considerable number of A3Ds and A4Ds in the fiscal 1958 budget now being formulated, and an additional number of both models on fiscal 1959 shopping lists.

"Barring unforeseen circumstances," he said, "we should have production of A3D and A4D airplanes through 1960. And, unless a superior replacement for them comes along, the production may extend beyond that."

The A3D-2, latest version of the A3D series, is now being delivered to the fleet, but there are sufficient additional models of this aircraft in the preproduction stage to offer a challenge to the previous AD Skyraider record of 28 different configurations.

Three variations on the A3D theme are now being produced on an assembly line parallel to the basic model production line, but the similarity ends with the general shape. The new models will have "beefed up," completely pressurized fuselages, and will be able to carry their crews at high operating altitudes while maintaining a cabin altitude comparable to any modern airliner.

A3D-2Q first new model

First of the new models is the A3D-2Q—equipped with electronic countermeasures and a crew of seven.

Second is the A3D-2P photographic airplane containing 12 cameras and a crew of three.

Third is the A3D-2T bombardier trainer—equipped with radar sights and navigational gear to be used as a flying classroom with five bombardier trainees and an instructor.

In addition, there is a tanker trainer version of the A3D under development.

With the exception of the latter model, the three new configurations are expected to have their first flight tests early next year.

Latest version of the 15,000-pound "hot rod" A4D, single-place attack bomber, is now well into production. Designated the A4D-2, it is expected to be in fleet squadron service this month.

This puts Douglas in the unusual position of building the largest and smallest Navy attack bomber, possessing both shipboard and atomic capability.

In the guided missile field, El Segundo has not designed and produced large quantities of missiles as such, but their experience has been considerable.

Air Force Association attacks defense economics

by Henry T. Simmons

THE AIR FORCE ASSOCIATION wound up its six-day convention in Washington last week, its spirits somewhat dampened by Defense Secretary Charles Wilson's vigorous economy drive.

As AFA members were getting ready for their annual meeting, word came from the Pentagon that four new USAF fighter aircraft are to be stretched out for approximately one year beyond their original production schedule. These are the McDonnell F-101B interceptor, the Lockheed F-104A day fighter, the Republic F-105B fighter-bomber and the Convair F-106 interceptor.

The somber note was confirmed early in the convention by Air Force Secretary James Douglas, who said the USAF must trim its latest spending estimate for the current fiscal year by nearly $1 billion. He also indicated that further Air Force cuts are on the way.

"We are in the process of screening development projects on a priority basis as it is certain that a number of the less urgent ones must be postponed and there are undoubtedly some that will fall by the wayside sooner than might have been the case except for the present need to find savings in all areas of our activity."

Symington attacks defense cuts

This news did not sit well with AFA or its supporters. Sen. Stuart Symington (D-Mo.) promptly blasted what he called "meat axe cuts" in the nation's defenses and told AFA that Americans may become the "richest people in the graveyard." The Association itself had some sharp criticism of the defense cuts and urged an increased appropriation from Congress to build offensive and defensive airpower up to "full strength."

In a proposed policy statement, AFA declared: "Any defense plan which assumes that technical superiority alone in modern weapons is adequate defense is a house built upon sand—an unrealistic measure of the nation's relative security. The immediate requirement is adoption of a military plan shorn of all wishful thinking, and with no consideration—political or economic—overriding that of national security."

But this sentiment collided head-on with Defense Boss Charles Wilson's determination to carve $2.2 billion from the military spending program this fiscal year in order to hold the Pentagon's total cash outlay to $38 billion—with no more than $19 billion to be spent during the first half of the fiscal year, July 1-Dec. 31.

"The bad news is not all out yet," Wilson told a Pentagon press conference early this month. He said the Navaho cancellation, the stretch-outs of the fighter aircraft and a $500 million cut achieved in maintenance and operation outlays accounted for about half the $2.2 billion spending reduction which must be achieved.

He did not specify the additional projects which must be adjusted to achieve the remaining saving, but he did say that aircraft and missile hardware programs are expected to provide between $1 billion and $1.5 billion of the total.

Debt ceiling blamed for cuts

The Defense chief said a principal factor in the Administration's campaign to halt runaway spending is the ceiling on the national debt. Unless military outlays are held to the forecast level of $38 billion, he said, the Treasury may not have enough money to pay the government's bills next January.

He told reporters he will continue his use of the expenditure ceiling to control military spending in fiscal 1959, the budget for which must be prepared in the late fall. He anticipated the fiscal 1959 ceiling will be approximately the same as the $38 billion level for fiscal 1958, but said he has not yet decided how it will be allocated among the three services.

Probably the most vivid expression of Wilson's present outlook on the Pentagon's financial situation came when a reporter asked whether he would authorize any increases in defense spending to improve executive compensation. Replied Wilson: "I wont approve anything that would raise costs one dollar in the frame of mind I'm in now."

The grim forecasts of Wilson, Douglas and other Pentagon officials added to the uncertainties of aircraft and engine company officials who were in attendance at the AFA convention, but none would allow themselves to be quoted as opposing the heavy reductions in store for the aircraft industry, and some felt the decline in military business was inevitable.

"I think it's going to be plenty tight, but I don't think it's going to be disastrous," commented Donald Douglas, Jr., v-p of Douglas Aircraft Co., Inc. "It's nothing like 1946 by any stretch of the imagination. People are making a little more out of the thing than is justified."

Courtlandt Gross, president of Lockheed Aircraft Corp., told AMERICAN AVIATION: "I only assume we are at the start of a long series of declining budgets. Historically, this industry has ebbed and flowed, and there has been nothing to make us think otherwise. We're being told to assume there will be less business, and we must cut the cloth to fit the suit." In this connection, he said, Lockheed is reducing its use of outside leased space and taking other steps to curtail overhead costs.

Ralph Bell, Director of Sales for the Transport Div. of Boeing Airplane Co. said he anticipates some reduction in his company's future sales and earnings unless there is some unexpected change in the military picture. He said this is probably true of the entire industry, since there are fewer dollars and more companies fighting for them. He agreed with recent military predictions that the number of aircraft industry prime contractors will shrink. "With the present trend," he said, "there wont be enough money to keep all the prime contractors in the business."

Republic, Chance Vought develop refueling systems

Two new jet fighter refueling systems have been revealed by Republic Aviation Corp. and Chance Vought Aircraft.

Republic has developed a low-cost "buddy" refueling system consisting of a 450-gallon tank which utilizes a set of pipes rather than a flexible hose to pass fuel to the receiver aircraft. Republic said the system was developed jointly with the Schultz Tool and Manufacturing Co.

Chance Vought has revealed that it has developed a telescoping probe for its F8U-1 Crusader. The probe, located aft of the cockpit, is operated hydraulically and moves out and forward a distance of 3.5 feet so that the pilot can easily observe both his probe and the trailing drogue of the tanker plane. Weight of the unit is 150 pounds.

The F8U-1 fighter will have a detachable version carried in a fuselage pod, while the F8U-1P photo version will have the refueling mechanism located internally in the fuselage behind the pilot.

McDonnell develops missile

McDonnell Aircraft Corp. is developing the GAM-72 Quail missile under a $4,539,772 contract with the Air Force. The missile is a countermeasures weapon.

Civil rights debate bogs aviation legislation

by Charles Schaeffer

The spotlight was focused on aviation legislation as Congressmen hopefully eyed the end of one of the longest sessions in recent years.

But as July closed the Airways Modernization Board bill stood out conspicuously as the one major piece of legislation to clear most of the hurdles.

The Administration bill, which passed the House 375 to 17, would have been slated to go directly to the President's desk where its final approval is virtually sealed. However, a technical amendment knocking out the Board's authority to transfer funds will send it back to Senate for second approval.

A log-jam of legislation created by civil rights oratory, was expected to delay formal endorsement by the Senate. The bill will provide for a three-man board authorized to select and test a military-civil air navigation system.

Opposition that never posed a serious threat to the first phase of Edward P. Curtis's long-range aviation plans was led by Rep. John Moss (D-Calif.) He bluntly termed the board "a layer of fat."

Moss said Congress was hurrying to establish a new agency "not because of any great enthusiasm for the agency but because it seems the expedient thing to do."

What troubled him, the lawmaker said, was the possible three-year delay in authorizing the Curtis proposal for a single federal aviation agency, which could offer a real and lasting solution.

Supporters, however, brushed aside objections and okayed the bill.

Praise for Gen. Quesada

As members debated the merits of the bill, the name of Lt. Gen. Elwood R. Quesada was posed as the likely man to step into the job as independent chairman of the board. Commerce and Defense Department secretaries or their designees will round out membership.

Gen. Quesada replaced Edward P. Curtis as the President's aviation aide to study the airways problem.

Rep. Harry G. Haskell (R-Del.), vocal backer of the Administration proposal, lauded Quesada's capabilities and discounted assertions that the Board will delay the aviation agency.

"The period of three years mentioned in this act was a maximum estimate of the time believed necessary to prepare and complete policy and management blueprints and to draft and coordinate legislation or reorganization plans creating a Federal aviation agency," he said.

Airline circles, meanwhile, applauded House Commerce Committee action endorsing a revamped capital gains bill. The legislation (H.R. 5822) was stripped of a retroactive provision that would have made it effective as of 1956.

Future of the bill, which will allow carriers to reinvest proceeds from the sale of aircraft in new planes without subsidy penalties, was clouded in a Senate bogged by civil rights debate.

Supporters, however, were confidently predicting that the bill will not meet fatal oppostion this year. Softening provisions limiting the proposal to the sale of aircraft equipment should make it more palatable, they say. A year ago dissenters beat the bill down, partly because of loose provisions.

Another part of package legislation designed to ease airline re-equipment problems, the so-called "equipment trust" bill, sponsored by Rep. John Flynt (D-Ga.), also advanced in the House. Reported out of the Judiciary Committee, it was headed for the floor, with the endorsement of certain local service carriers.

This bill (H.R. 7671) would make banks preferred creditors on aircraft equipment loans.

Hearings were wrapped up on a 90% government-guarantee loan bill (H.R. 7993), also being anxiously watched by the local service airlines. The bill—which will provide government guarantees on loans up to 90%—originated in CAB.

Senate Commerce Committee has endorsed its own version of the loan legislation (S. 2229). The revised bill would require carriers to purchase only new aircraft equipment under the loan authority. Excepting helicopter lines, carriers not covered by the original bill would be blanketed in. They are Mackey, Alaska, Pacific Northern and Caribbean-Atlantic.

Vinson issues warning

Hearings on legislation aimed at tightening up negotiated procurement were launched with a sharp warning from House Armed Services Committee chairman Carl Vinson (D-Ga.). The bill (H.R. 8711) incorporates recommendations from the Hebert Investigations Subcommittee (AMERICAN AVIATION, July 15, p. 35).

Vinson rebuked Pentagon procurement chiefs for the heavy use of negotiated procurement. He recalled that Congress was legislatively committed to advertised bidding procedures and observed that Congress probably provided too many exceptions to advertised practices in the first place.

The Vinson bill will lift from the procurement rules the controversial 1950 Korean Emergency Proclamation under which the Pentagon did much of its military buying as late as 1956. It provides for a new, clearer meaning of the term "negotiation," its proponents say, and will destroy secrecy enveloping current negotiations.

Key Defense Department purchasing officers however, view the bill from a different angle. It would, they contend, seemingly require endless negotiations with *all* bidders, including those outside the competitive range.

Pentagon advocates of existing negotiation powers appeared to irk Vinson, who, with other members of the committee, strongly suggested DOD to ease up on lop-sided use of negotiation for their own good.

In the lower chamber the long-anticipated probe of the aircraft engine industry never gained much momentum. With only the Curtiss-Wright Corp. testimony on record, the Hebert Investigations Subcommittee postponed hearings indefinitely.

Elsewhere in congress, airline observers followed strict legislation calling for international carriers to hew to letter of international agreements. The bill (S-2540) incorporates parts of two other proposals and would require CAB to run an annual check on foreign carriers operating over U.S. domestic routes.

If passed, it would also give U.S. carriers the long-sought right to a voice in international air talks.

Earlier, the House voted legislation that would grant permanent certification to U.S.-Alaska air carriers. The heavily-discussed bill (H.R. 4520), would affect Alaska Airlines, Pacific Northern Airlines and Northwest's inside, or Segment (2) route covering operations between Minneapolis/St. Paul, Edmonton, Canada, and Anchorage, Alaska.

The lower chamber overrode objections by Commerce Secretary Sinclair Weeks, and the Budget Bureau in passing the bill.

In supporting the bill, House Commerce Committee Chairman Oren Harris (D-Ark.) ticked off eight reasons permanency could save money for the government. It would eliminate the expense of recertification procedures, he said, and put investment by States and municipalities in aeronautical facilities on a "less speculative basis."

Of subsidy he said: "We think it will reduce the Federal subsidies, it will give them (the carriers) an opportunity to develop their service and obtain the equipment needed in order to reduce subsidy requirements."

The bill is pending in the Senate.

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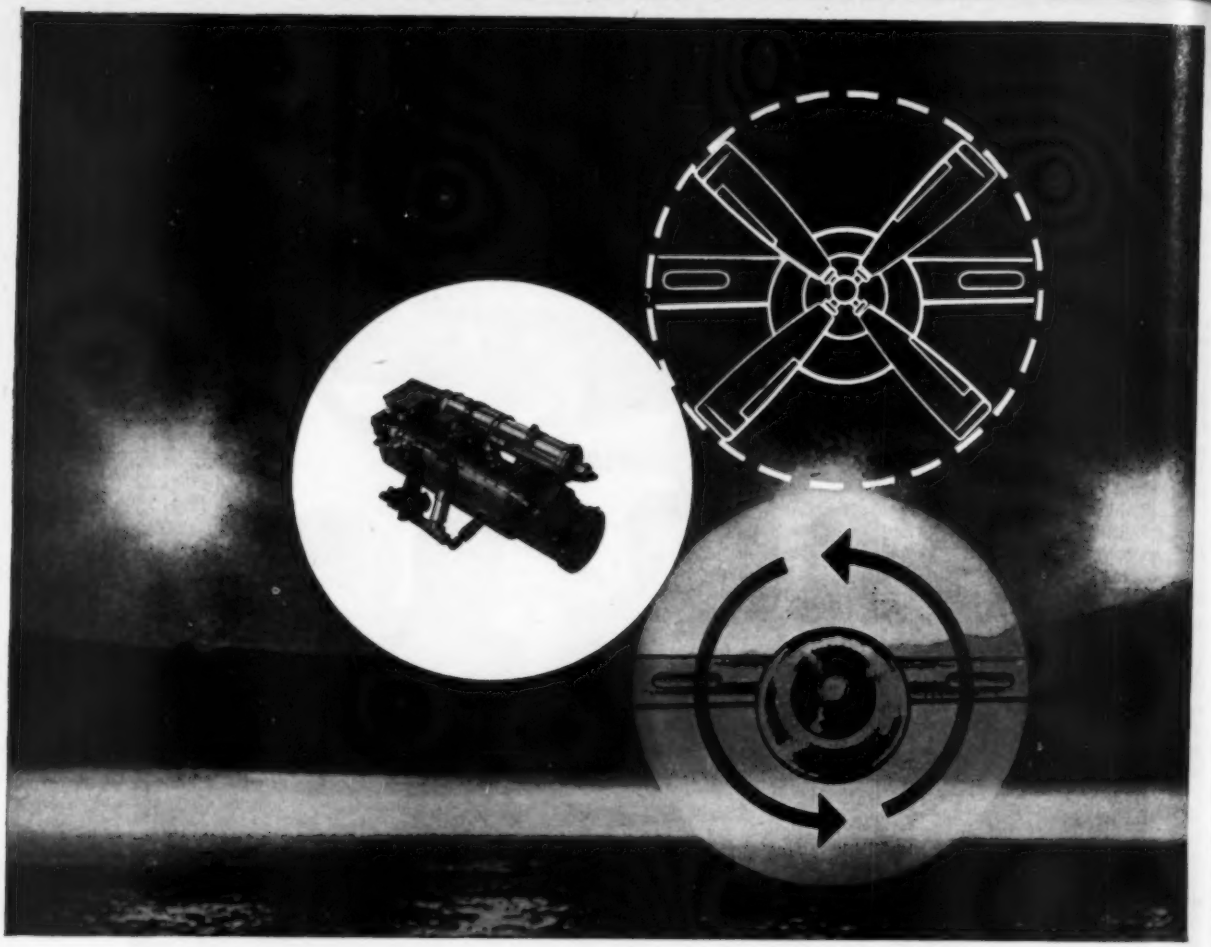

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New defense policies shake aircraft investors' confidence

by Selig Altschul

BUDGETARY LIMITATIONS and transitions within the military establishment have shaken investor confidence in aircraft equities.

The Administration determination to confine military expenditures to around $38 billion a year so as to achieve a balanced budget means that there simply is not enough money to go around to finance all the programs the Air Force and Naval aviation would like.

Moreover, the projected and well-publicized shift to guided missiles and supporting electronic elements from manned aircraft has also meant ferment of changes within the industry. These factors create doubt and confusion among investors and are disturbing to their faith in the long-range investment qualities of the aircraft industry.

With military aircraft expenditures at sustained high levels in recent years, considerable substance was evident for many of the aircraft and engine builders together with their satellite suppliers.

For example, expenditures for aircraft and related items climbed sharply from $1.7 billion in fiscal 1950 to $8.6 billion in fiscal 1952 and fluctuated annually in the narrow range of between $7.8 billion and $9.2 billion ever since.

Wide range of appraisal

It was this high level of military aircraft and related procurement which created investment values among aircraft equities. These were values supported by earning power and, more often than not, by moderate dividend payments.

The accompanying exclusive AMERICAN AVIATION compilation reveals the wide range of investor appraisal of aircraft equities from the relative low point as recent as 1954 to early this year, when peak prices for virtually most aircraft shares were established, and to recently, after serious deterioration in market valuations had taken effect.

It can be seen that from 1954 to early 1957, without exception, all aircraft equities shown experienced substantial price appreciation, varying only as to the degree of gain realized. On a percentage basis, top honors in this respect belong to Cessna, Curtiss-Wright, General Dynamics, Boeing, McDonnell and North American.

Even taking into effect the recent price declines, substantial as they have been from the peaks of early this year, all equities shown continue to command prices above the 1954 lows. Again, it becomes a question only of degree as to the measure of gains retained.

Market vs. book values

The recent wave of selling, among other things, has served to place market prices in closer relation to book values. While General Dynamics remains the stand-out with its equity commanding a market price more than three times book, the bulk of the other issues shown sell at slight or moderate premiums to book.

Some investors look to the market-to-book value ratio as a benchmark in judging investment relationships. However, frequently this can be most misleading as reported book values may be less—or even greater—than that shown. At best, in the aircraft industry, book values may serve as a guide to a company's position in respect to possible renegotiation when earnings are related to a return on net worth.

It is earning power which remains the basic determinant in establishing investment values for the aircraft group or any other industry. And it is this consideration which influences the abilities of the aircraft group to attract essential investment support if it is to obtain needed capital to conduct expanding and changing operations.

Investors tend to capitalize earnings in the marketplace. The greater the risks, the smaller the price paid for earnings. This condition characterizes broad industrial groups in comparison with one another and is very pronounced even among the separate companies of a given industry. This becomes self-evident in looking at the price/earnings ratios for the 18 aircraft equities in the accompanying table.

While there are a number of wide extremes, ranging from less than five times 1956 earnings to more than 15 times earnings, the bulk of equities sell in the narrow band of between seven and nine times 1956 earnings.

But such evaluation is most seriously qualified by the measure in which a company's particular outlook may influence its future earnings. In other words, encouraging as past results may be, a company in order to continue to

Selected financial data (per common share) of aircraft manufacturers

Companies	Market Price 1954 Low	Market Price 1957 High	Current [1]	Book Value [2]	Market/Book Value Ratio	Earnings Per Common Share [3]	Price/Earnings Ratio
Beech	$7.125	$31.25	$22.50	$18.50	1.21	$4.45	5:06
Bell	11.625	24.125	17.875	14.96	1.19	2.21	8:08
Boeing	11.625	61.125	40.50	22.30	1.82	4.82	8:40
Cessna	6.875	43.75	31.50	21.36	1.47	5.75	5:48
Curtiss-Wright	7.75	47.375	41.125	22.68	1.81	5.15	7:99
Douglas	26.375	91.00	73.25	42.65	1.72	8.96	8:18
Fairchild Engine	9.625	12.25	9.75	12.17	0.80	0.64	15:23
General Dynamics	12.00	68.625	57.25	18.40	3.12	4.14	13:83
Grumman	20.375	34.625	23.75	21.60	1.10	3.50	6:79
Lockheed	26.00	57.125	38.75	36.10	1.07	5.10	7:60
Martin	15.125	47.375	31.25	21.95	1.42	3.73	8:38
McDonnell	9.50	44.75	31.875	18.73	1.70	4.55	7:01
North American	10.00	39.25	25.125	19.04	1.32	3.59	7:00
Northrop	7.50	28.125	25.125	17.26	1.45	3.28	7:66
Republic	18.125	32.75	23.625	31.52	0.75	5.00	4:72
Ryan	14.875	43.50	35.00	29.96	1.19	3.86	10:42
Temco	5.875	18.375	12.625	6.63	1.92	1.35	9:35
United Aircraft	30.125	90.25	63.50	34.57	1.84	7.05	9:00

NOTES: [1] As of July 25, 1957; [2] At 1956 fiscal or calendar year-end; [3] 1956 fiscal or calendar year.

SOURCE: Standard & Poor's Industry Surveys.
Wall Street Journal.

merit investor support at prevailing levels must maintain at least the present rate of earnings and, better still, show an uptrend in profits. Hence, the market is constantly discounting the future as far as it can.

NAA's equity declines

For example, while North American Aviation appears well on its way toward earning between $4.25 and $4.75 per share for its fiscal year to end Sept. 30, 1957, a material improvement over 1956 results, the company's equity has declined considerably.

This situation is nothing more than a reflection of the current expectation that 1958 earnings may be lower than that for any of the previous two years.

It is for this reason that selectivity within the aircraft industry is becoming more and more important. And this becomes a process of establishing the relationship of each company in the separate military and commercial programs now under way.

Moreover, these programs, as demonstrated by recent experiences, are subject to change. This requires constant vigilance to stay with the "going" programs. It is this circumstance which contributes to the many risks in the aircraft and related industries. To many this means pitfalls and losses. To others it can mean opportunities and profits.

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Two major airlines show losses for first half

Financial results reported by four more airlines show two with losses for the first half of 1957, one with sharply reduced profit for the same period, and one with less profit for its fiscal year.

TWA's six-month net loss was $1,114,000 on total revenue of $119,524,000 against a $1.7 million loss on $112,110,000 sales in the same 1956 period. This year's deficit was reduced by record June travel, which produced earnings for the month of $4,018,000 before taxes compared with $2,774,000 earnings a year ago.

Calling for a fare increase, president Carter L. Burgess said: "We sold nearly 7% more business than last year, kept our operating expenses rigidly in line, yet wound up with a deficit for six months which included the greatest June in history."

Eastern Air Lines' net operating profit for six months dropped more than 50%, from $7,521,000 in 1956 to $3,632,000 this year. Expenses outgained revenues, the former rising from $99,650,279 to $129,967,811, the latter from $119,002,374 to $138,206,000. Revenue passengers increased from 3,860,313 to 4,491,005 but load factor dropped from 64.4 to 61.03, with the decrease attributed to "multiple competition imposed by CAB on several of the company's main operating routes."

Delta Air Lines earned $2,622,000 net for the 12 months ended June 30, compared with $3,369,196 net in the preceding year. Operating revenues gained 18% from $66,804,625 to $78,596,003 but expenses rose 23% to $72,510,934. Passenger-miles reached a record high of 1,299,000,000, but passenger load factor fell.

Capitol Airlines' first-half net loss was $769,941 against a $934,587 loss in the same 1956 period. Operating income totaled $704,956 compared with operating loss of $1,166,118 last year. Net loss resulted from a rise in interest charges from $440,155 to $1,930,066 while gain on equipment sales fell from $662,170 to $409,287.

Operating revenues were up 56.9% from $28,157,084 to $44,169,229 while expenses rose 48.2% from $29,323,202 to $43,464,273. Passenger-miles jumped 57% to 708,653,454. In the second quarter, Capital had $1,100,230 net profit against a $108,498 net in the same 1956 period.

Aerial jeeps for Army

Army has awarded three contracts for a total of six aerial jeeps of three different types. Aerophysics Development Corp., has received a $387,831 contract for two four-ducted aerial jeeps; Chrysler Corp. will build two two-ducted aerial jeep vehicles for $661,441 and Piasecki Aircraft Corp. will build two research vehicles.

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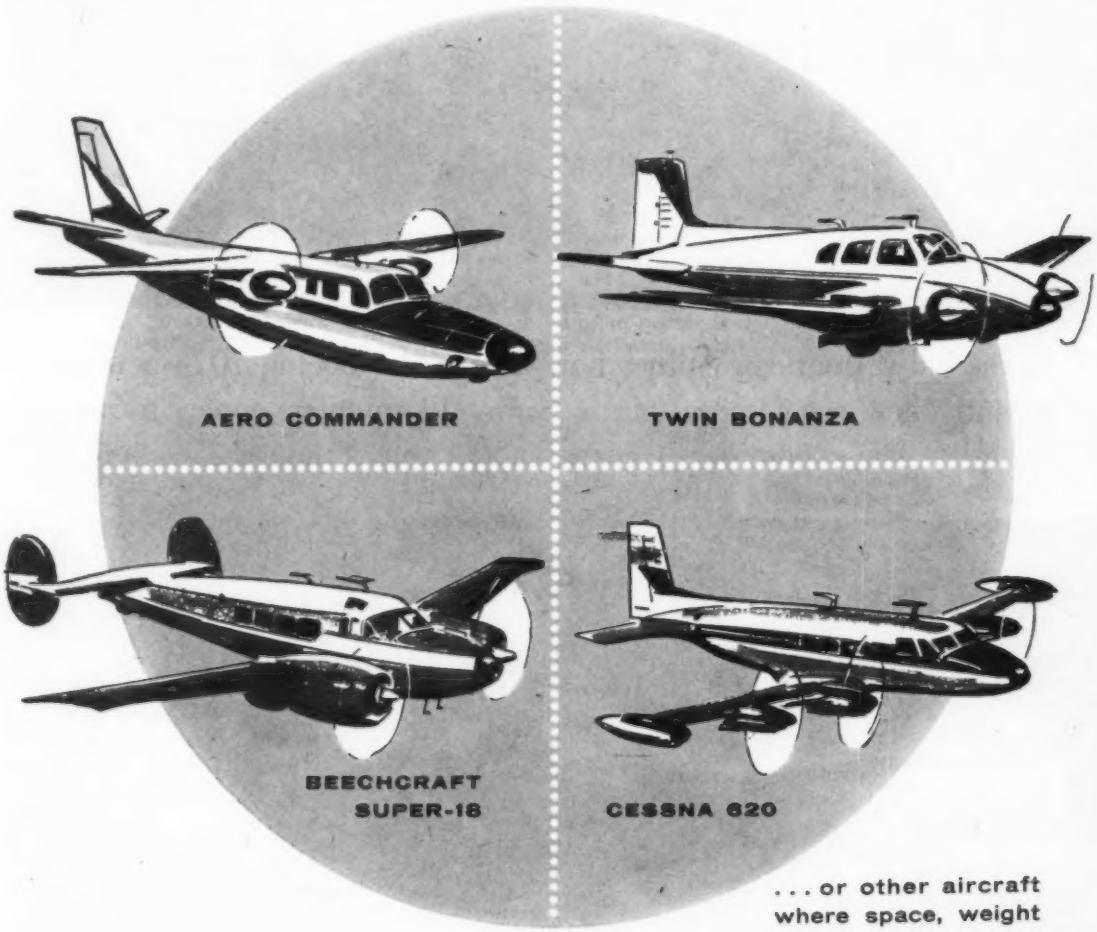

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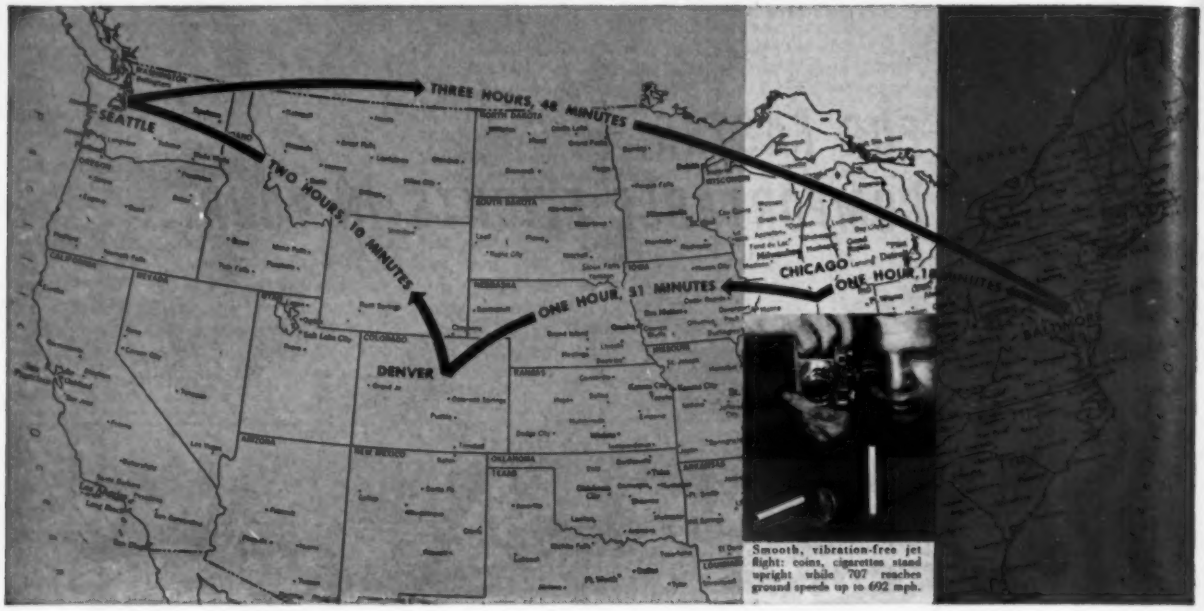
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BOEING 707

AF unveils F-105, J75-powered fighter-bomber

Most recent addition to the century series aircraft, Republic Aviation's supersonic fighter-bomber, the F-105 Thunderchief, was unveiled at Andrews AFB, Camp Spring, Md.

"As a tactical striking weapon we know of nothing to match it on either side of the iron curtain," said Mundy I. Peale, president of Republic.

Featuring two distinctive snout-like air-intake ducts to feed a single Pratt and Whitney J75 turbojet engine of the 15,000-pound-thrust-class (without afterburner), the F-105 was designed to carry nuclear as well as conventional weapons.

The Thunderchief can be refueled in flight at very high speeds and high altitudes.

The F-105 incorporates "area rule" design, to reduce drag and instability at transonic speeds, and features the following innovations:

1. Highly efficient swept-forward air-intake ducts, whose size and shape are said to contribute to the plane's flying stability by "shattering" shock waves and reducing their effects on the tail surfaces.

2. A ram-air intake at the base of the vertical fin, which directs air to cool aft end of ship.

3. Conical camber formation of the wing leading edge, which reduces induced drag in the important subsonic region. Republic adds that the wing shape is such that the pilot can adjust it to reduce drag at cruising speed and to eliminate wing-tip stall at high angles of attack.

4. "Clover leaf" speed brakes that form the last three feet of the fuselage. During braking, these surfaces unfold at right angles to the line of flight and serve as a 360-degree spoiler.

5. Main landing gear that folds into wings, thereby freeing payload volume in the fuselage, and accounting in part for the forward position of the ducts.

F-105 physical dimensions: length, 63 feet, 1 inch; height at tail, 19 feet, 8 inches; wing span, 34 feet, 11 inches.

A stretchout of the Thunderchief production program was recently ordered by the Air Force to permit incorporating advanced electronic equipment in the remaining aircraft.

THUNDERCHIEF features snout-like air-intake ducts which are said to increase plane's flying stability. Channels abutting fuselage at air-intake ducts location are believed to bleed off low-pressure boundary-layer air for more efficient scooping action.

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Modern-day airline companies increase their maintenance and overhaul facilities by using Air Associates as their stock room for frequently needed parts and accessories. Only a few air miles away from main airline centers, Air Associates serves to streamline operations... helps meet tight schedules for greater airliner utilization.

More and more airline purchasing agents are relying on Air Associates in-stock service for on-schedule deliveries. Here is only a partial listing of Air Associates-distributed quality products:

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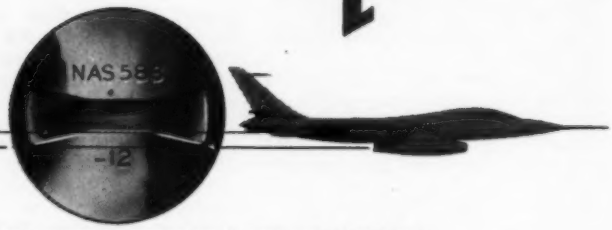

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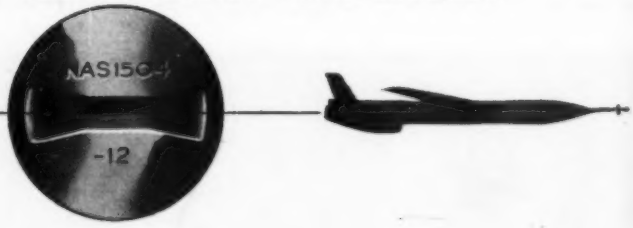

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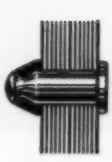
This fastener combines simplicity of design with superior strength and endurance, and features high driving torques, high tensile strength and high fatigue life.

HI-TORQUE Bolts are only one in a family of fasteners being produced by the Hi-Shear Rivet Tool Company. Research and development in Hi-Shear laboratories will continue to provide fine fasteners for use under all conditions.

* Sizes 3/16 thru 5/8 in countersunk and flat heads—in 4130, 4140 and AMS 6304 alloy steels; 17-4PH, AM 350 and type 431 stainless steel, Inconel X, A-286 super alloys and 6-4 Titanium. Other materials on special order.



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Circle No. 19 on Reader Service Card.

Modern materials multiply uses of airborne heaters

New applications include rockets, missiles, cameras, instruments, industrial processes, aircraft components

by William Beller

IF TEMPERATURE SPECS for airborne systems are too stiff to meet, don't run to your contracts officer for a waiver—instead, create your own environment. In this way, Don Barbouy, manager-engineering, Special Products section of General Electric, states the case for supplementary heating equipment.

During World War II, heating devices were employed for quite obvious purposes: electrically heated flying suits, boots, gloves and mittens, goggles and other equipment needed for flight personnel.

Less obvious uses included heating devices for aircraft components such as camera covers, bombsight covers, oil accumulator tank covers and so forth. For the most part, these covers were converted bedroom blankets.

Today, an advanced state of the art has thrust the heater business into a newly found prosperity, in part based on using materials such as epoxy and polyester resins, plastics, metal foil, rubber, and improved textiles and fabrics.

Typical heater designs

Wire on aluminum foil
Gives maximum heat transfer and cross-conductivity. With glass-insulated resistance wire, operating temperatures up to 500°F can be provided. With vinyl-insulated resistance wire, excellent for low wattage heaters. Odor-free, fungus-resistant. Also available with fiber, cloth and paper backings.

Blanket construction
Water repellent, fungus-resistant, fire-resistant, tear-resistant, great flexibility. Wire size, wire design, heat distribution and thermal insulation to suit application.

Lightweight rubber or silicone sandwich
Excellent for flat or curved surfaces. Moisture-resistant. Can be bonded to metal on one or both sides where rigidity is important.

Thermoplastic laminate
Excellent optical qualities.

Metal-clad construction
For relatively high wattage density for small areas. Wide variety of sizes.

Polyester resin laminate
Moisture-resistant. Wire pattern arranged to suit particular need. Close wire pattern can be provided for uniform wattage distribution.

Silicone laminate
Moisture-resistant. Can be bonded to various metals. Various shapes can be provided. Heating element can be arranged to suit particular need.

Many applications

Some of the product categories for these new heating devices are:

Rockets and missiles. Electric and insulating blankets, component blankets, internal heaters on sub-assemblies, hydraulic and electronic systems.

Cameras and instruments. External and internal heaters for photographic, recording, indicating, detecting, optical and measuring devices.

Industrial processes. Heaters and insulating equipment for chemical, photographic, metal-forming and material laminating and bonding processes.

Aircraft components. Heaters and blankets for control surfaces, propellers, inlet scoops, pitot tubes and aircraft structural and environmental testing.

There are three approaches available to an engineer designing components able to survive in a wide temperature range. These are:

1. Design the components to work satisfactorily over the entire temperature range from —65°F to 1,000°F. This is an engineering nightmare and not advised for the faint in heart.

2. Take standard components and either cool or insulate them against heat at the higher temperatures. Cooling, however, is usually expensive and involves appreciable weight. Insulating jackets may be the better answer. Several such jackets are currently being used on several types of electronic equipment, where the requirement is to delay the temperature rise of the equipment during a two-hour period when elevated temperatures are met.

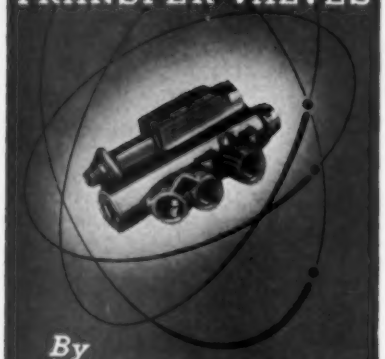
3. Design components for high temperature operation only and provide supplementary heat at the lower temperatures. For example, a component is designed to operate in the 700°F to 1,000°F range. For ambients below 700°F, a heater is used to maintain the component at a temperature above 700°F.

Practical design problems involving heating devices were solved in the following case histories drawn from GE files:

A missile manufacturer unhappily

ELECTRICALLY-HEATED blanket used on this Honest John missile keeps propellant at temperature required for optimum performance.

TRANSFER VALVES



By
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The one shown is:
MC 1750 VALVE — TRANSFER SOLENOID OPERATED
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FLUID: MIL-O-5606 Hydraulic Oil
OPERATING PRESSURE: 1500 psi
TEMPERATURE RANGE: —65°F to +165°F
PORT CONNECTIONS: Per AND 10050-8
INTERNAL LEAKAGE: 5cc/min. max.
PRESSURE DROP: 25 psi at 6 GPM
SOLENOID: Applicable paragraphs of specification MIL-S-4040
Continuous duty .75 amps max. at 24 volt DC
OPENING OR CLOSING TIME: .10 seconds max. at rated pressure and flow
WEIGHT: 2.65 lbs.
MILITARY SPECIFICATION: Applicable paragraphs of MIL-V-5529
Non-interflow type

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discovered that most of his installed components would not operate adequately at low temperatures. In addition, the missile's booster, which used a solid-grain propellant, had to be protected from low temperatures, or it would crack and burn improperly. It was also essential that the heater be quickly removable once the missile was installed on its launcher.

The final blanket design bore a hasp and grommet arrangement coupled with a quick-disconnect strap. This made it possible to remove the entire blanket in about half a minute when the missile was in the ready-to-fire position.

Other requirements called for a constant equipment temperature of 40°F, and environmental specifications such as flame resistance, low moisture absorbtion and anti-fungus characteristics. Heating units developed under these needs have shown continued good performance for the two years they have been in service, according to the manufacturer.

Other cases solved

The second case involves a battery heater, which had to be dependable and rugged for use in a missile guidance system. To complicate the problem, specs called for heaters that would not deteriorate when exposed to potassium hydroxide spillage. The answer was a molded neoprene heater whose resistance wires were embedded in the neoprene.

Another application called for a rigid shell heater to be mounted on a rocket casing. A heater was developed which used resin-impregnated fabrics suspended in resin and formed in a closed cell insulation between two semi-cylindrical aluminum sections.

This type construction provided in-flight heat for the propellant and other components. At the same time, this heater formed the outer skin of the rocket.

Warming cold feet

A new jet transport had a unique problem. The floor under each crew station was directly over several air-conditioning ducts, which brought the floor under crew members down to 60°F. Cold feet resulted. The solution called for a thin polyester resin heater with imbedded resistance wires which was placed under the aluminum floor at the crew stations.

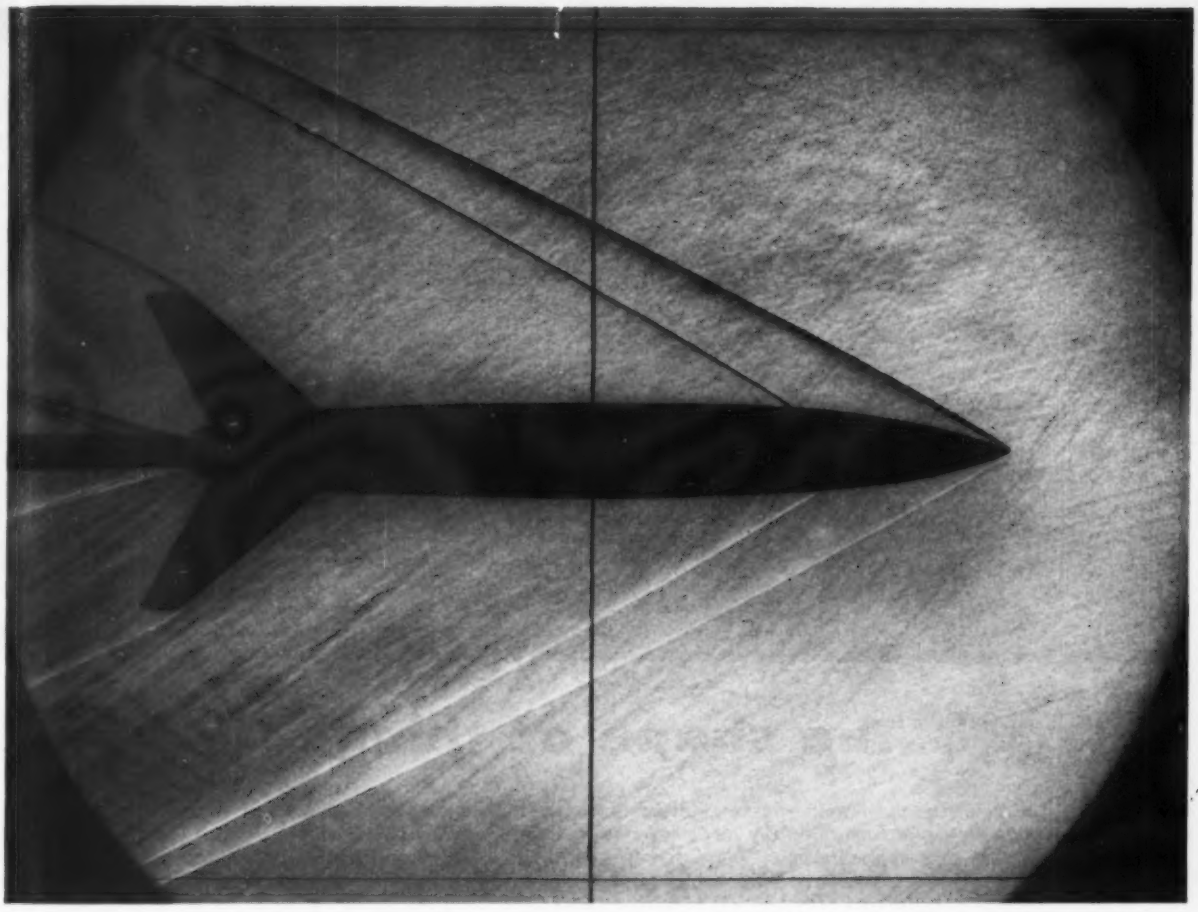
A similar application exists on a commercial transport flying scheduled flights to Europe over the northern route. Here, it was the galley floor that required heating.

In the photographic field, a trend has been to heat internally the critical areas of cameras. These heaters use resistance wire embedded in silicone laminates or attached to glass fabrics with various resins. These fabrics are then bonded to metal parts that become integral to the camera. In some cases, the fabrics are bonded directly to the inside of the main camera casing.

Because of varied specifications, heaters must be custom-engineered and manufactured. This leads to a job-shop type operation and no off-the-shelf items. For blankets, patterns are developed through garment-industry techniques. Once the patterns are drawn they are used for cutting the materials, which are then stitched together to form the required shape.

HEATER USED for field repair of honeycomb structure packs 15,500 watts in a three-sq.-ft. area.

EARLY-TYPE CAMERA HEATER. Later types embed resistance wire in silicone laminates or glass fibers, which are bonded to metal parts.



Schlieren photograph of supersonic flight patterns in wind tunnel.

There is a formula behind America's supersonic might

The fate of freedom cannot hinge on trial and error. Our future security depends on making major supersonic advances at a quickening tempo... on developing aircraft, manned and unmanned, to fly at far beyond today's speeds and altitudes.

North American Aviation's experience in the design and production of supersonic aircraft—by far the greatest in the Free World—is focused full upon this vital problem. The new aircraft and weapons systems now in progress will be as remarkable tomorrow as these achievements of today:

Supersonic capability of North American's brilliant F-100 Super Sabre series has given the Air Force its most dependable supersonic fighter. In 1953, the first production-line F-100 flew faster than the speed of sound on its first flight. In 1954—two years before any other supersonic airplane became operational—the Air Force had F-100s in wing strength. There's still no Air Force operational airplane that can match its tactical and combat versatility.

Supersonic history will be made by North American's X-15 experimental rocket-powered airplane. It will carry man faster and higher than he has ever flown before. It is setting the pace for the Air Force of tomorrow.

Other major supersonic projects at North American: a long-range interceptor for the Air Force at the Los Angeles Division, and the A3J, a carrier-based attack weapon system for the Navy, at the Columbus Division.

From the P-51 through the F-86 and the F-100, North American has designed planes with growth potential to use more power as it became available. It has translated this ideal performance into wing-strength reality—accurately, rapidly, and at lowest possible cost.

The formula for supersonic strength in the future is supersonic experience today. North American has it.

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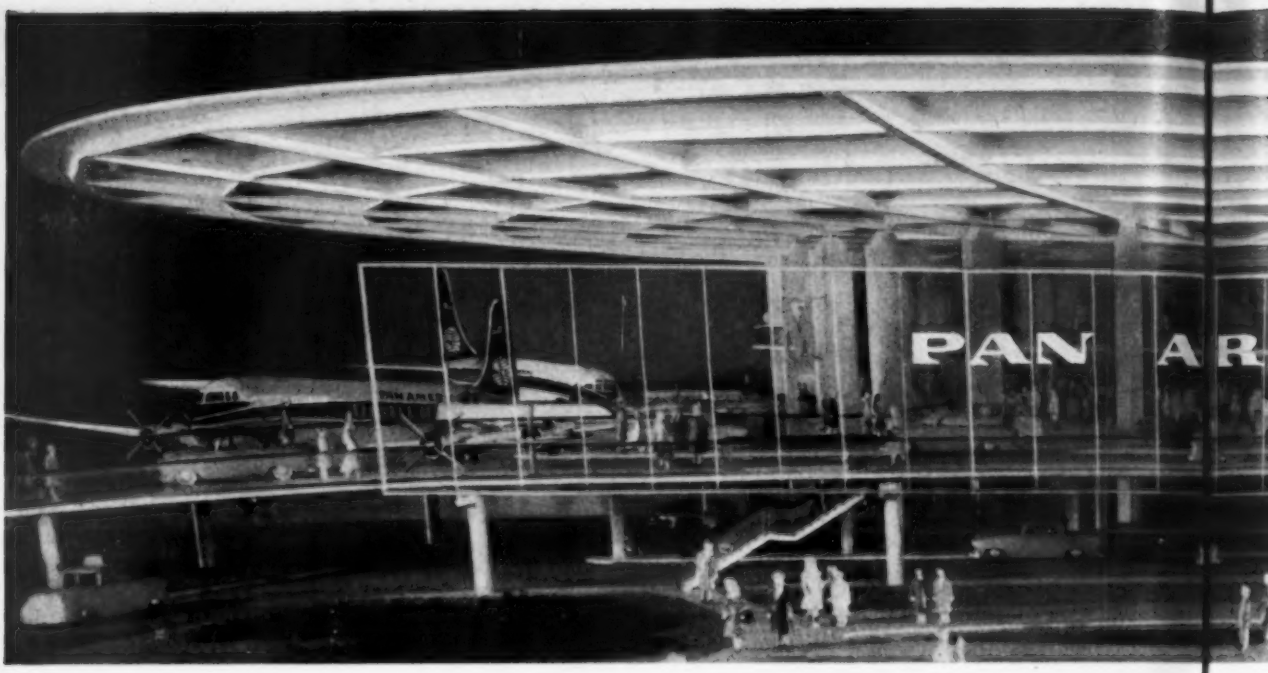
NORTH AMERICAN HAS BUILT MORE SUPERSONIC AIRCRAFT THAN ALL OTHER COMPANIES COMBINED



The shape of things to come... an

The airline terminal of the future—tailored to the desires and requests expressed by air travelers over the years—*is already underway.*

Oval-shaped, glass-encased . . . with an umbrella-like roof, the structure is a complete and exciting departure from the ordinary concept of airline terminals. Its debut: 1958 at New York International Airport. Its builder: Pan American World Airways.

Hailed by the Port of New York Authority as "an ingenious approach to the problem of air terminal design," it will accommodate cars and taxis at the rate of *1800 an hour* and enable passengers to go from arriving vehicles to waiting planes without ever being exposed to the weather. Its cantilevered roof, *four acres in area,* will extend out 110 feet over the aircraft parking space, allowing the planes to come to the passengers.

Clippers* will load from a raised gangway extending from the terminal's second-floor passenger lounge to the plane's cabin lounge. The terminal will be able to handle a 160-passenger jet Clipper *every 15 minutes.*

Curtains
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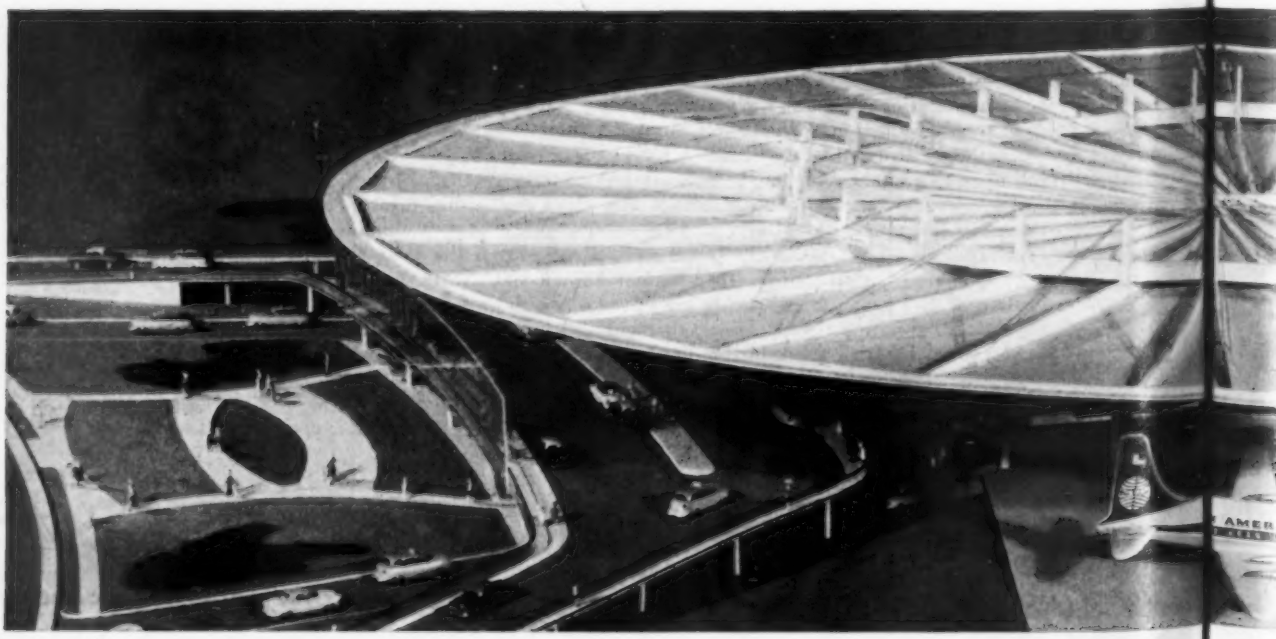
Long
too. All
entrance
waiting



..and go

Curtains of air will replace heavy doors. Produced by a mechanism which will blow air down from above and suck it through a grating in the floor, these "air curtains" will eliminate the job of pushing through heavy doors with luggage, while keeping the building completely weatherproof.

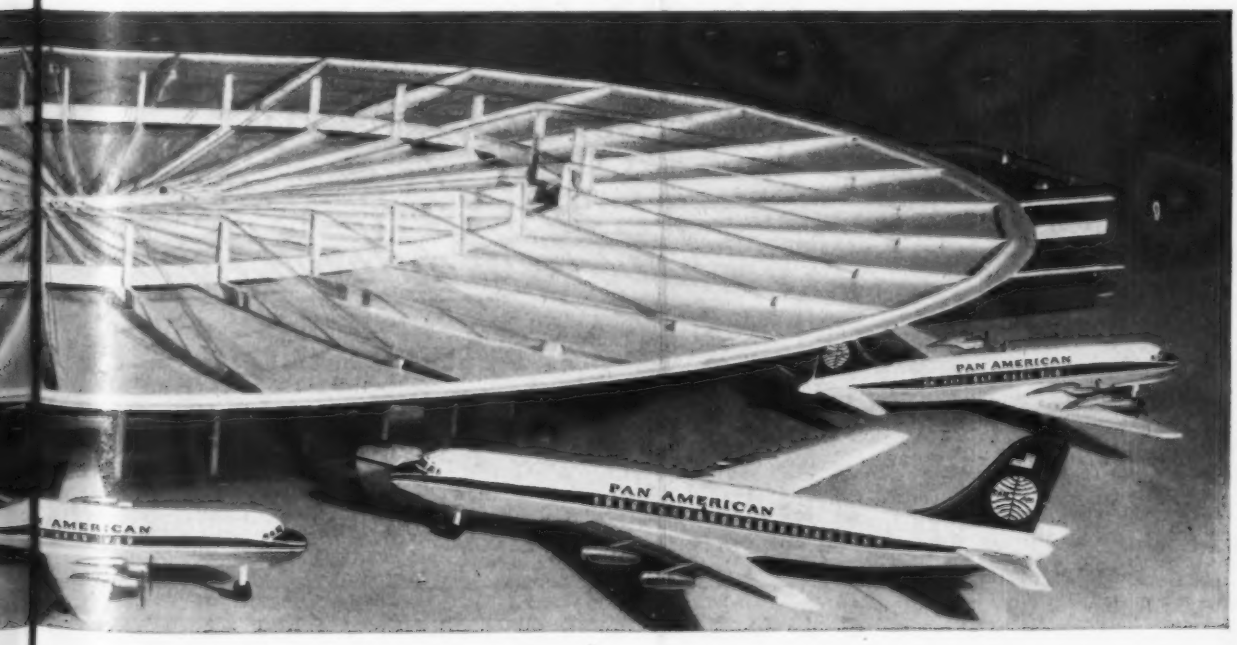
Long walks to check-in counters will be eliminated, too. All counters will be within forty feet of the terminal entrance and there will be 48 of these counters to keep waiting time down to an absolute minimum.

These are only some of the wonderful and refreshing changes that someday will be found in *all* terminals. For the speed of jet flying will necessitate ground facilities keeping pace. Once again, Pan American is happy to show the way.

*Trade-Mark, Reg. U. S. Pat. Off.

The first responsibility of an airline is to be a *useful* citizen.

PAN AMERICAN



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Czech aircraft builders emphasize export sales

Avia-14, carrying price tag of $270,000, pushed as replacement for DC-3; big improvement over Il-14

by Anthony Vandyk

PRAGUE—Czechoslovakia's nationalized aircraft industry is currently engaged in an aggressive export sales drive on both sides of the Iron Curtain.

In discussions with top officials of Omnipol, the industry's export agency, and during a visit to the plant where an improved version of Russia's Ilyushin 11-14 transport is built, this writer was left with the distinct impression that the Czechs have a good chance of winning new markets for their aeronautical products.

By staging a series of demonstration flights in almost every part of the world, the Czech aircraft industry has made most of its models both known and appreciated. Established at the end of World War I, the industry has built aircraft of all types from gliders to four-engine transports and jet fighters.

During World War II Czechoslovakia built a variety of German models and the German influence continued for several years after the end of hostilities. In recent years Soviet influence has mounted and the Czech industry has become a second source for certain Russian military and commercial models.

Production of Russian aircraft in Czechoslovakia has been arranged on the basis of license agreements between the Russian and Czech governments which permit the Czechs to export the license-built plans as well as supply them to the Soviet Union. Although the Czechs have exported military aircraft to the Middle East (Messerschmitt Me 109s to Israel in the late forties and more recently MiGs to Egypt) the present export program is built around civil types.

At the Paris International Airport Show in June the Czechs had no military types on hand. However, a Czech export official told this writer: "Had we known that other nations were to feature military aircraft so prominently we would have brought along our UT-MiG (jet fighter-trainer)" Apart from that reference, Czech officials declined to discuss Czechoslovakia's military aircraft program.

One of the secrets of success of the Czech aircraft industry's export effort has been in pricing. All models are very competitively priced and extremely attractive terms are arranged. The twin-engine Super Aero sells for $25,000. The Avia-14 twin engine transport, equipped with radio and 24 seats, carries a price tag of $270,000. The sleek Meta Sokol personal plane, which is about to go into production, will be priced at about $9,500. The STOL Brigadyr multi-purpose aircraft is priced at $15,000.

While the Czechs are specific on prices, they tend to be vague on the subject of operating costs. The Avia-14, for example, has no operating costs quoted for it although when questioned Czech officials described the cost as "similar to that of the DC-3."

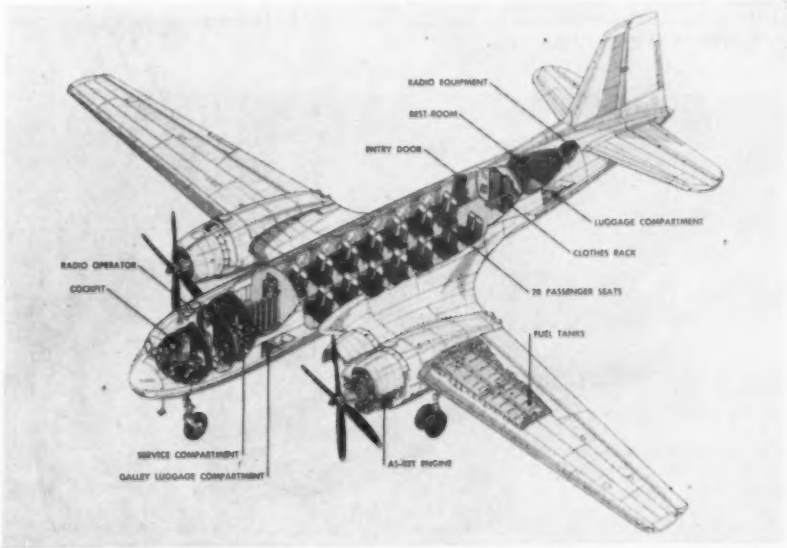
As for the overhaul life of the Avia-14s' M 82T engines, the only information that could be obtained was that an initial life of 500 to 800 hours could be counted on and that, with the development of the engine, progressive improvement could be expected.

The most important aircraft being built by the Czech industry is undoubtedly the Avia-14, an improved version of Russia's I1-14. In production for almost two years, the Avia-14 in its latest version corresponds dimensionally with the I1-14M, the stretched-fuselage version of the Russian I1-14. The original aircraft built by Avia was identical with the I1-14. Only 50 of these were produced.

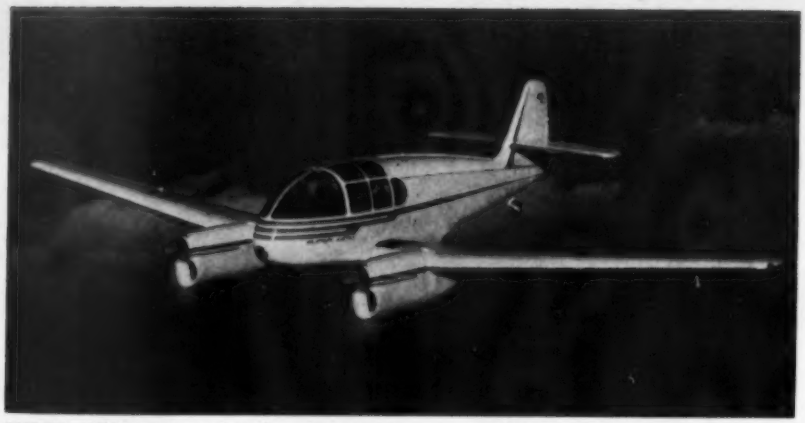
At present two Avia-14s come off the line each week. To date most of the production has been bought by Aeroflot although some aircraft have been supplied to eastern European satellite nations and to Red China. In early June CSA, the Czech airline, took delivery of the first of five Avia-14s.

The Avia-14 represents a real advance on the original I1-14, which accommodated only 18 passengers. The Czech aircraft in its present standard production version seats 28 passengers and this can be increased to 32. With 28 or 32 seats, the Czechs say the Avia-14 is a most suitable DC-3 replacement for operators in countries where pressurization and turbine engines represent unnecessary frills. With its two 1900-hp M 82T engines the Avia-14 is over-powered and thus has excellent takeoff performance.

A takeoff run of 1,470 feet is quoted while the distance for takeoff over a 50-foot obstacle is 2,950 feet. Landing distance over a 50-foot obstacle is given as 3,280 feet and landing run as 1,800 feet. In its 28-seat ver-



AVIA-14 is pride of Czechoslovakia's aircraft industry. Basically an improved version of Russia's Ilyushin 11-14, twin-engine transport, built in Avia plant near Prague, accommodates 28 passengers. It is being exported in large quantities to Soviet Union and China and is being offered as a DC-3 replacement outside Communist bloc.



SUPER AERO twin-engine transport has been on market for many years and several hundred have been exported to all corners of world. Its 105-hp Walter Minor engines give it a top speed of 168 mph. Landing speed is 62 mph. Super Aero can carry a pilot and three passengers. Normal range is 480 miles.

BRIGADYR STOL aircraft bears strong resemblance to Fieseler Storch. It is being exported in quantity to several Iron Curtain countries. Powered by a 220-hp Praga Doris B engine, it needs a takeoff run of only 745 ft. to clear a 50-ft. obstacle and lands under similar conditions in 640 ft. Top speed is 119 mph while stalling speed is 32 mph with power on.

META SOKOL now flying in prototype form will come into full production by end of year. All-metal personal aircraft is powered by a 105-hp Walter Minor. Accommodating a pilot and three passengers, it grosses 2,028 lbs. and has a top speed of 143 mph. Range 528 miles. Will take off over a 50-ft. obstacle with run of 1,510 ft.

sion with an hour's fuel reserve range is 810 miles. Top speed (at 7,400 feet) is 256 mph while the economical cruising speed at 6,500 feet is 200 mph.

The Czechs describe the single-engine performance of the Avia-14 as excellent. Once airborne the aircraft can fly on one engine. The propeller of the dead engine can be feathered within 5 seconds. The hydraulically operated gear retracts in five seconds while the doors of the gear are designed so that they are closed when the gear is extended, thus minimizing drag during takeoff.

In the event that the engine-drive hydraulic pump does not function, the entire hydraulic system for the gear can be operated with a hand pump. Should the entire hydraulic system become unserviceable, the front gear leg can be lowered with the use of a special jack actuated by compressed air. Two generators, one on each engine, supply DC current of 28 volts. The various accessories and systems use AC current of 115 volts.

The M 82T engines are 4-stroke, 2-row 14-cylinder models. They are fitted with injection pumps, electric inertia starters, generators and the usual accessories. Engine starting is facilitated in winter by an oil-dilution system. The propellers are four-blade automatic constant-speed units, controlled hydraulically.

Constructionally the Avia-14 is orthodox. The wing is a cantilever structure of trapezoidal planform built as a complex box spar with three webs. This is said to be very good from the fatigue aspect. The airframe is mainly built of D-16T duraluminum.

In improving on the orginal Russian design, the Czechs were able to cut down weight considerably. In the Il-14 there is a large quantity of very heavy equipment. The Czechs were able to substitute lightweight items in every case. The resulting performance gain has been considerable.

The Czech system for manufacturing Avia-14 is much the same as that followed by the Russians in the original Ilyushin-14 plant in Moscow. Not only are the airframe and the engines made by the Avia company, but also most of the components. Only the landing gear, propellers and radio equipment appear to be made outside the Avia organization. This writer was able to see during his visit to the plant the manufacture of the toilets, galleys and seats for the Avia-14.

A large amount of hand labor goes into the Avia-14 production and the plant appeared to be rather overstaffed by western standards. Although the facilities were not modern and the plant generally looked shabby (as does nearly everything in Czechoslovakia) the quality of the aircraft coming off the line appeared to be very good. The finish and standard of workmanship was comparable to that prevalent in the west and certainly the aircraft looked better than the Russian-built version of the same model.

Details of de Havilland Gyron, Mach 2-3 turbojet

by James Hay Stevens

LONDON—Security downgrading of the 20,000-lb.-dry-thrust de Havilland Gyron affords first opportunity of seeing the internal layout of a turbojet designed specifically for supersonic flight.

Conceived originally seven years ago by the late Maj. Frank B. Halford as the H.4, the Gyron is essentially a Mach 2-3 powerplant which comprises an afterburner and multi-leaf convergent-divergent propulsive nozzle.

By using a low-pressure ratio engine, weight is kept down and heat-rise through the compressor is limited to a value permitting combustion at a fuel/air ratio sufficient to give high thrust without exceeding practical turbine temperature limits.

Afterburning is considered to give highest propulsive efficiency in the Mach 2.5 zone and the engine was never seriously considered without it. In the Gyron, the geometry is such that the automatic multi-leaf nozzle covers the whole thrust range from subsonic unaugmented to supersonic with afterburning.

Penalty for low pressure ratio, probably a round 5 to 1 as in the early centrifugals, is a similar high specific of more than 1.0. This should be viewed together with the exceptionally high thrust/weight ratio of 4.8 and thrust/frontal-area of 1,895 lb./sq. ft. This is achieved by the large hub/tip ratio of 0.495 to 1 and the high air mass flow (classified) which it gives.

Unique structural feature is the use of a two bearing rotor shaft made possible by a low-weight inherently stiff rotor. This latter was achieved by tapering the drum-disc-shaft assembly to a large center diameter, thus lowering torque stresses. Shortness of engine, consequent upon two-bearing layout, and specially developed thin compressor blading are further lightening features.

The air intake assembly of the Gyron comprises a nose bullet, fairing the HTP turbo-starter, and an integral casing for the front rotor bearing housing and seven radial arms to the periphery which contains an integral annular oil tank. Material is magnesium alloy.

There is a single row of hollow-steel variable-incidence intake guide vanes, followed by seven compressor stages with all-steel, extra-thin blading. After passing through a double row of flow-straightener blades the air is diffused into the combustion chamber. This is of true annular type with a single annular flame can.

The primary air enters the head of the flame can through seventeen individual ducts with swirl nozzles from

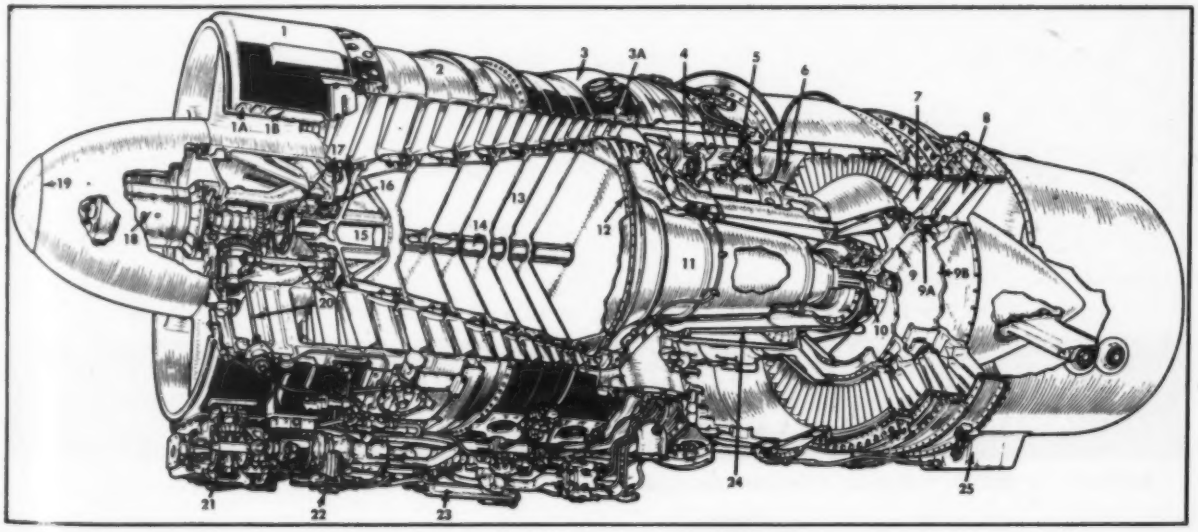
Specifications & performance data, de Havilland Gyron

Height	55.2 in.
Width	49.9 in.
Intake casing diameter	46.25 in.
Length, basic	121.3 in.
with exhaust cone and nozzle,	155.5 in.
Dry weight	4,270 lbs.

Performance

Gyron 1	
Sea level static thrust	15,000 lbs.
Specific fuel consumption	0.95
Gyron 2	
Sea level static thrust	20,000 lbs.
Specific fuel consumption	1.04
Sea level static thrust*	25,000 lbs. plus

* Dry rating, with afterburner.



Key to cutaway of de Havilland Gyron

1—Air intake casing integral with support arms and front bearing housing.
1A—Anticing air annulus.
1B—Oil tank annulus, level gaged by sight glass.
2—Light-alloy compressor casing for first four stages.
3—Steel casing for final stages.
3A—Compressor-blood annulus.
4—Primary combustion air intake scoop and swirl nozzle (17 total).
5—Upstream Lucas fuel injector (17).
6—Annular flame tube.
7—Air-cooled hollow nozzle guide vane containing tie rod joining inner and outer turbine shroud rings.
8—Pin-mounted interstage blades.
9—First stage turbine disc joined to second stage wheel (9B) by peripheral drum (9A).
10—Rear bearing, single roller journal.
11—Steel low-torque trumpet shaft.
12—Peripheral bolted joint to compressor drum.
13—Compressor disc drums with pinned blades.
14—Aluminum spacer tubes.
15—Front disc and bearing journal.
16—Front bearing, with journal and two thrust races.
17—Quill drive for starter and accessory gears.
18—D.H. H T P starter (10 secs. to light up).
19—H T P exhaust—superheated steam and oxygen which can go thru engine.
20—Variable incidence guide vane actuator linkage, final drive is toothed ring on stub of vane.
21—Accessory gears.
22—Fuel strainer.
23—Fuel-cooled oil cooler.
24—Stress-carrying inner air casing.
25—Fuel drain collector.

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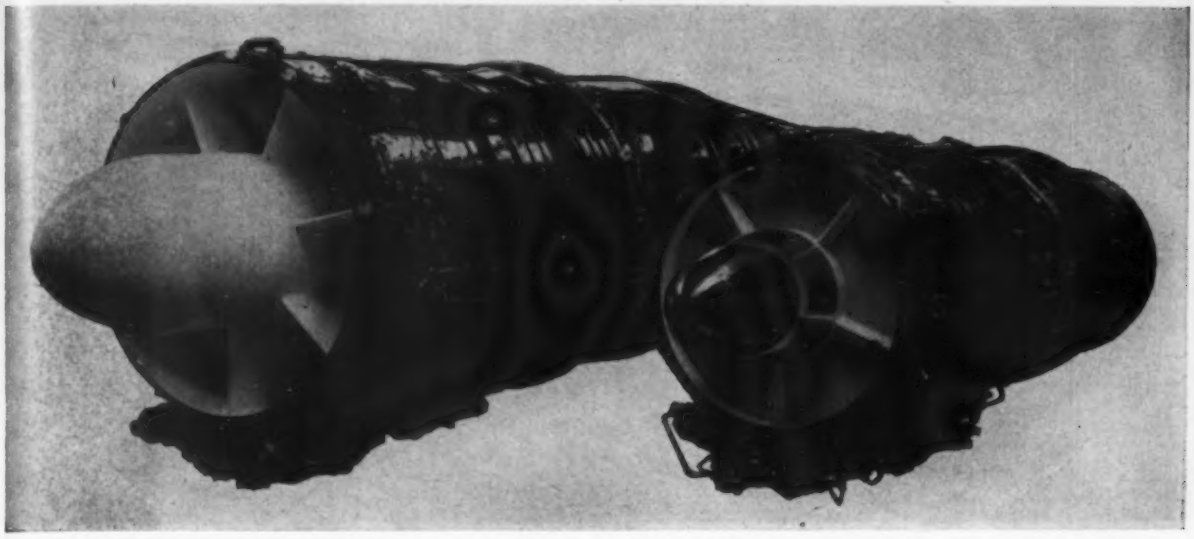


FAMILY PORTRAIT. Size of the de Havilland Gyron (left) is emphasized when compared with the Gyron Junior (right).

which it impinges on the 17 upstream fuel injectors. Secondary air enters through numerous openings in the inner and outer walls of the flame can. The outer combustion chamber casing is a one-piece unit that widens toward the rear before being nipped-in sharply at the delivery nozzle. (The inner wall of the combustion chamber forms a stress-conveying tube between compressor and turbine casings).

Hollow air-cooled turbine nozzle guide vanes deliver into a two-stage turbine. Combustion chamber, annular flame can and both fixed and rotating turbine blades are fabricated from Nimonic nickel alloys.

Currently, the Gyron is being developed as a private venture for the Hawker P 1121 "Hurricane" fighter, reportedly at an estimated additional cost of around $2 million. This brings the wheel full circle, since the Gyron started as a private venture of de Havilland, which capitalized it with some $3 million.

Accepted by government

The engine was accepted by the Ministry of Supply on completion of a special type test, after which investment was repaid, and a bench-and-flight test program (in the Short Sperrin) inaugurated at government expense. With the switch to missiles the Ministry of Supply has shelved the Gyron and transferred all support to the two-fifths-scale, half-thrust Gyron Junior.

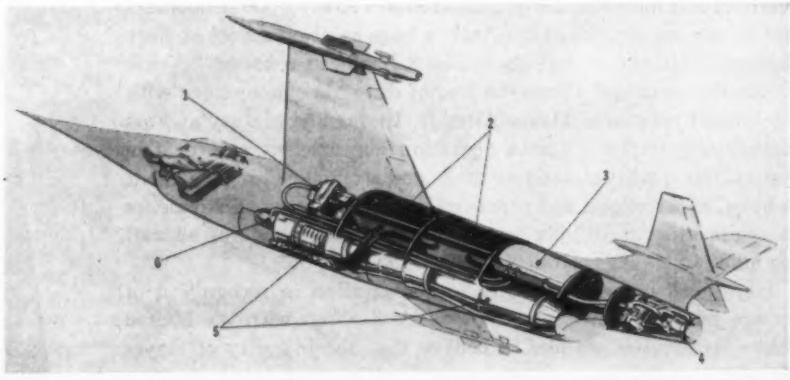
D. H. is currently completing supersonic bench and laboratory facilities at Hatfield for Gyron and Gyron Junior development. A 24-inch Mach 3 wind-tunnel will be used to develop intake configuration.

There is a new ram test bench where the Junior can be run under supersonic sea level conditions and, presumably, Mach 2 and even Mach 2.5 simulation at altitude.

Details of mixed-power fighter proposal

This is a de Havilland artist's impression of a hypothetical Mach 2 fighter with an afterburner-equipped Gyron Junior turbojet (5) and a Spectre controllable liquid-propellent rocket engine (4). Such a mixed power aircraft is capable of maintaining its very high rate of climb in the stratosphere. It has the ability, at such height, to accelerate very rapidly to high-supersonic interception speed and has adequate power to maneuver at extreme altitude.

The availability of high-test peroxide in this aircraft makes possible a compact and lightweight auxiliary power unit (1) to drive the aircraft's auxiliary gearbox at any altitude. High-test peroxide (3) is used also on the small but very powerful starter motor (6) while kerosene or JP4(2) is used as fuel for the turbojet.



Fairey reveals new details of HARP (Rockoon)

New details have been revealed of the HARP (High Altitude Research Project) vehicles built by the Special Projects Division of The Fairey Aviation Co. of Australasia Pty. Ltd. for the Australian Weapons Research Establishment. This is the popularly named Rockoon—a rocket launched after being initially lifted by a balloon.

The rocket body is made from glass-fiber-reinforced plastic and is a plain missile with four double-wedge airfoil tail fins and a solid propellant.

Specifications: rocket gross weight, 500/520 lbs.; propellant, 270 lbs.; burning time, 3-4 secs.; max. velocity, 4,500 ft./sec. (3,070 mph); peak acceleration, 60 Gs; ceiling, 300,000 ft.; total flight time, 4-5 mins; launching altitude, 30,000/40,000 ft.; balloon height 100 ft.; diameter, 40 ft.; welded polythene sheet, 0.02 in. thick; hydrogen capacity, 12,000 cu. ft.; empty weight, 100 lbs.; total lift, 750 lbs., free lift, 70-75 lbs.; rate of rise 1,000 ft./min.

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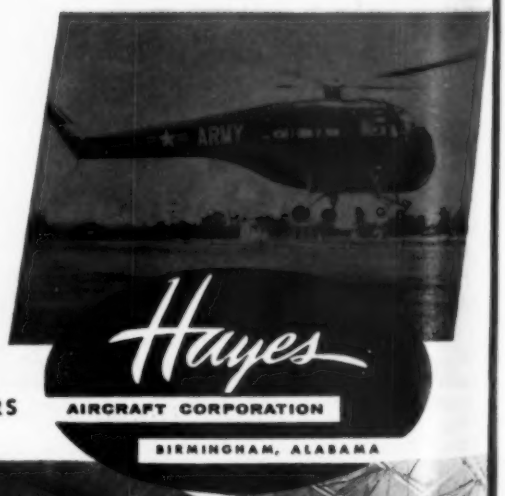
Hayes has not received any formal citation in recognition of service rendered during our first year's dealings with the United States Army. But we like to believe that the integrity of Hayes Aircraft Corporation has been recognized in a more material way — renewal of our contract for daily inspection and maintenance of all aircraft at the Army's mammoth training center at Fort Rucker.



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Aerojet-General unveils 30-lb. PWI system

Infrared system may be ready for airline evaluation by year-end; airborne radar also being seriously studied

by Richard van Osten

A 30-POUND proximity warning indicator, based on infrared energy, will probably be available for operational evaluation around the end of this year, according to Aerojet-General, whose Infrared Avionics Division developed the system.

The first detailed description of the new PWI was given to representatives of airlines and airframe manufacturers at a meeting of ATA's Technical Committee on Collision Avoidance and ARINC's Airlines Electronic Engineering Committee in Los Angeles.

Aerojet's system shared the spotlight at that session with present-day airborne weather radar as possible alternatives for solving the interim proximity warning problem.

Aerojet holds no illusions as to whether or not their design is the ultimate. They very clearly state their proposal is an interim one, and a "stepping stone" to a finalized version, but the company believes they have reached the stage where they are prepared to offer the system to commercial operators for evaluation.

Remarks from the floor of the meeting indicated that most airline representatives agree with the "interim" philosophy, but feel the need for a PWI system is so great that any realistic approach (from a commercial operator's standpoint) to the subject should be tried if only to find the right track for future development.

The decision to use infrared energy is based on the company's considerable experience with such devices now being used by the military, plus the fact that a major part of the equipment to be used consists of modifications to existing Aerojet components.

The proposed system is divided into three parts: the IR receiver; the power supply and electronic processing unit and the presentation or indicator device. Three receivers will be required —one W12 azimuth scanner and two W13 hemispherical scanners—all feeding into a common display.

The W12 equipment covers a 360° azimuth zone in a 15° band, completely surrounding the aircraft. The W12 receiver consists of an hyperhemispherically shaped infrared dome which protrudes from the aircraft's fuselage, a motor-driven mirror, inclined at 45° and rotating continuously through a 360° arc, an uncooled lead sulphide detector, and an infrared optical system to focus the longer-wave length infrared rays.

In a typical installation, the W12 unit could be mounted on top of the fuselage, just forward of the bulkhead separating the passenger and crew compartments. On some airplanes, this location allows the scanner to "see" a small portion of the propellers and the vertical stabilizer. A cam-actuated shutter can be timed to block out this portion when the scan crosses the area, or the visual indicator can be masked to cover the undesired areas.

Signals from the W12 receiver are routed through an attached preamplifier, through a remotely mounted driver-amplifier package and to the final display.

This unit protects a major portion of the danger area around the airplane, but does not cover the situation of one aircraft settling down onto another. The latter coverage is supplied by the W13 unit with short-range, low resolution, wide-angle characteristics.

The W13 is a proposed receiver, designed specifically to cover the 800-foot area requested by the ATA in its suggested performance criteria for PWI systems. Two of these units would be used, one on top of the fuselage; the other on the bottom. Because of their locations, the lower W13 in particular, discrimination between wanted and unwanted signals could be a problem.

There are several methods of IR signal selection or discrimination now in use, and Aerojet has proposed a method that is not new, but has never been exploited because of its limitation to short range.

Given the code name of "Operation Birdwatch" during its development at Aerojet, the technique consists of detecting the infrared energy modulation produced by the propellors or jet plumes of observed aircraft. Ground sources of infrared energy do not produce the same type of modulation, either in characteristics or frequencies. This technique has been investigated by amplifying the signals received on an infrared detector and listening to the output through earphones.

Over the inherent hiss of the lead sulphide detector, a characteristic sound similar to an engine roar but lower in pitch, can be heard whenever a propeller-driven aircraft was detected. In the case of a jet aircraft, the sound is almost identical to the blast of a turbojet but also consider-

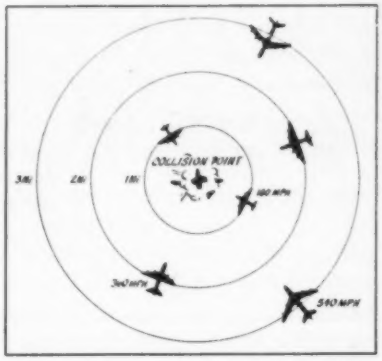


FIGURE 1: Locations of intruding aircraft 20 seconds prior to collision with a 360-mph aircraft.

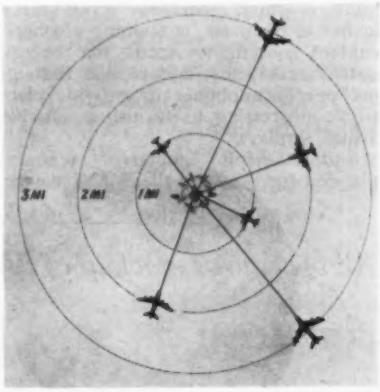


FIGURE 2: Coverage provided by a nominal PWI (horizontal flight).

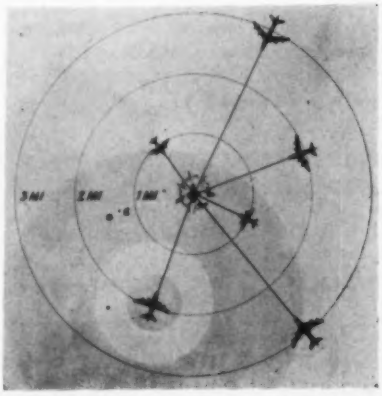


FIGURE 3: Coverage provided by a nominal PWI (fixed vertical rate of closure).

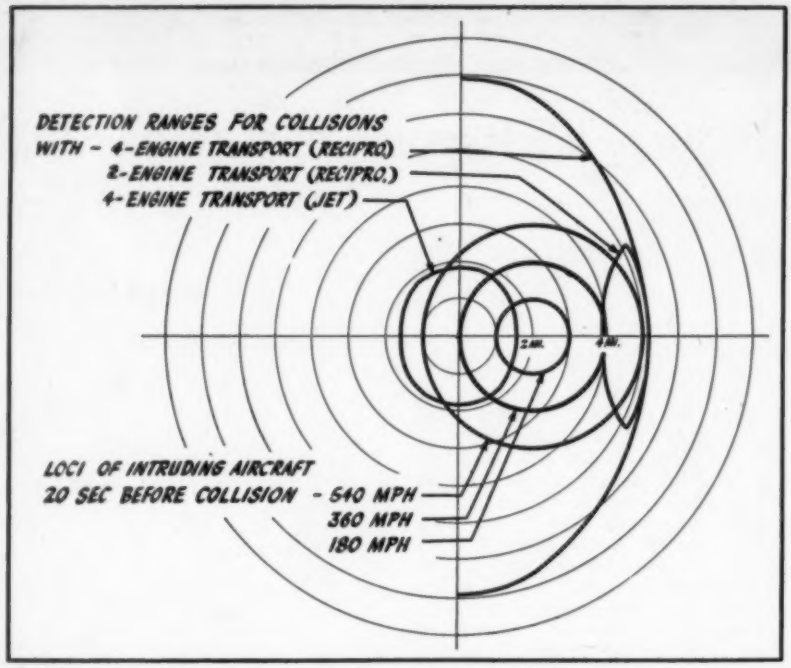


FIGURE 4: Proximity warning coverage for installation under 360-mph cruise speed conditions.

ably lower in pitch.

Aerojet believes it is possible to build a small receiver, about three inches in diameter, containing a spherical-lens system to focus the energy onto the detector, and receive the signal over headphones or provide electronic processing to furnish a suitable visual display.

The display unit, or scanner, planned for use with the W12 receiver, is a three-inch diameter instrument with an airplane outline in the center to orient the pilot. Behind the glass-front plate, the scanner has a rotating disc with an arrow cutout, and behind the disc is a light. If there are no signals of intruding aircraft being received, the arrow remains opaque.

When the W12 receiver detects an aircraft in the vicinity, a pulse from the receiver flashes the light behind the arrow cutout at a steady rate of one-to-two cycles per second. The angular position of the arrow indicates the "look" angle of the receiver and the direction of the intruding airplane in relation to the protected aircraft.

Successive flashes may show movement of the arrow, indicating the other airplane is passing by. However, if the arrow stays put, a constant bearing on a collision course is indicated.

Additional information from the W13 might be displayed in a similar manner. If an intruding aircraft appears above and to the right of the protected aircraft, an arrow sign will flash in the upper right of the dial face in addition to the arrow on the rotating disc. The same display principle would apply to aircraft to the left and above, or to the left and right and below, except the arrow signs would flash on the proper bottom corners of the instrument dial.

Aerojet has used an interesting approach to the range capabilities of their system. Although the package exceeds the two-mile ATA horizontal detection requirements as far as actual miles away are concerned, the company does not feel that distance per se is the absolute answer.

It has been assumed that 20 seconds is the absolute minimum reaction time in which to establish evasive action after an intruding aircraft has been detected. This is broken down into a six-second search by the pilot; two seconds to evaluate and react, four seconds for aircraft reaction and eight seconds maneuver time.

The situation shown in Figure 1 is based on the 20-second value as applied to a "nominal" PWI system, not the Aerojet-proposed system. If the observer is in an aircraft on the 360-mph circle and is collision-bound at the end of 20 seconds, the other aircraft must be on one of the other speed circles.

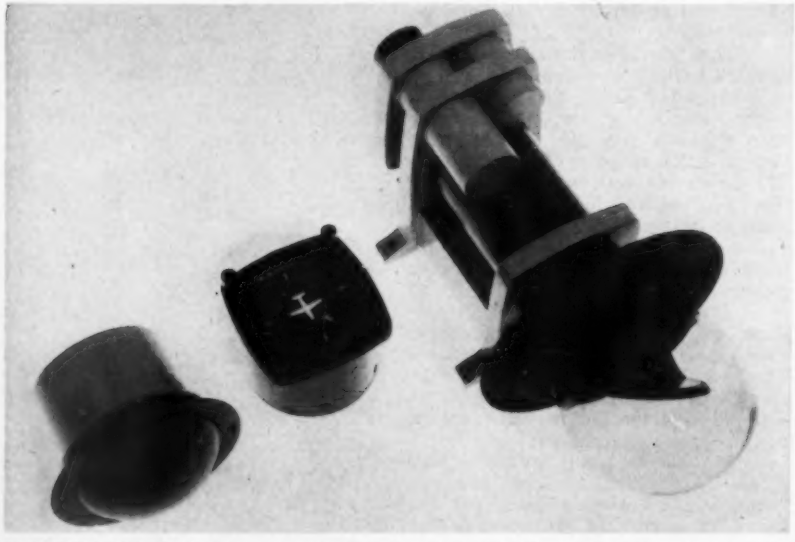
If the horizontal detection range of a PWI is superimposed on the collision diagram as shown in Figure 2, the range circle includes all aircraft which *can* be detected, and the velocity circles represent all aircraft which *must* be detected.

Again using the performance of a "nominal" PWI system, but as applied to a collision situation resulting from a fixed vertical closing rate, Figure 3 shows the regions in which a 20-second warning time can be furnished by either the hemispherical or narrow-angle scanning equipment, and a region without a 20-second warning period.

Since the proposed PWI is passive, its detection ranges depend upon both the type of aircraft observed and its aspect. So, the requirement becomes the problem of furnishing sufficient detection ranges for all aircraft locations which represent possible collision situations.

Detection range curves for various aircraft at cruise speeds are shown in Figure 4, and are essentially the same

Aerojet shows mockup of PWI units



WOODEN MODELS of major components of Aerojet-General's infrared proximity warning system (l. to r.) include: W13 receiver, proximity indicator and W12 receiver. Units weigh 30 lbs. with required power supply and amplifiers, will be available for airline test late this year.

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RATED FLOW: 6 GPM
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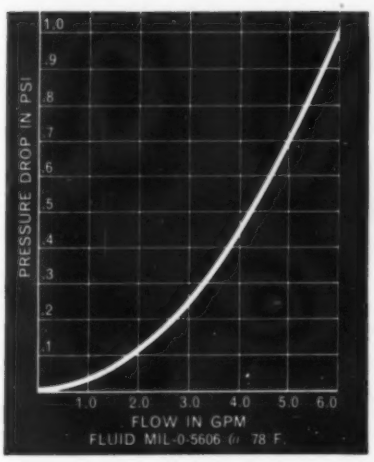

Here is a remarkable achievement in valve design – a design suitable for any type of shut off application!

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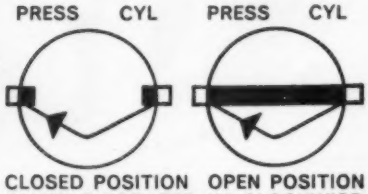

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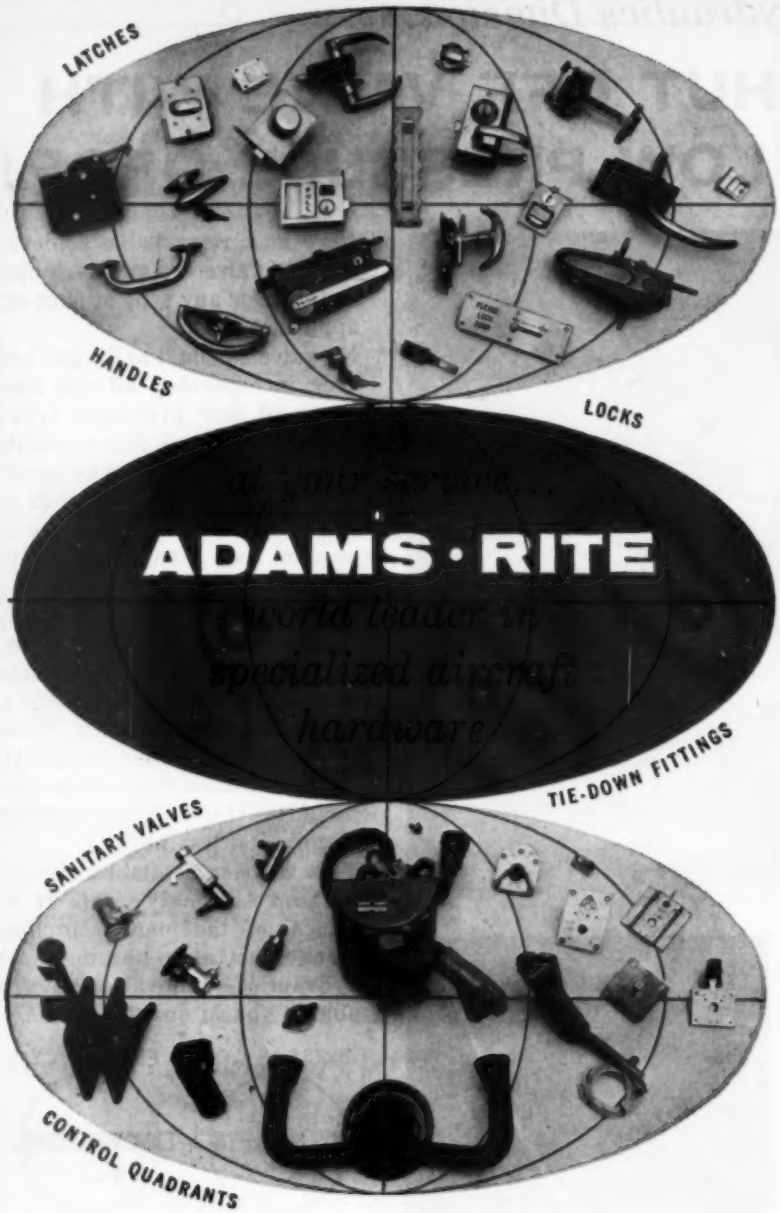

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as those in Figure 2, except a constant range was assumed in Figure 2.

From the study of this figure, it can be seen that all possible collisions with a 180-mph aircraft may be anticipated more than 20 seconds in advance. In the case of collisions between two 360-mph aircraft, the umbrella-like line applies. Examination of all possible positions on the 360-mph circle shows that the only aspects visible are from the beam position around to the nose, but, again, complete coverage is provided. The protection against collisions with jet transports is represented by the almost circular figure surrounding the present position of the protected aircraft.

Aerojet has left the final action of collision avoidance to the pilot. They believe a pilot may better evaluate a "tactical situation" change during a maneuver, and his decision can be tempered by existing traffic or landing conditions, where an automatic system must make general decisions. Use of the pilot as a "computer" in the system will result in relatively simple equipment for PWI functions, the company says.

There are some disadvantages to this arrangement. The pilot may not always be able to see or identify the target indicated by the PWI, in which case a Collision Avoidance System would indicate or initiate action. A pilot is less accurate than a computer in calculating range and range rate of change and thus may not be as well equipped for planning the timing and duration of an avoidance maneuver. The pilot is also range-limited under certain weather conditions, whereas the CAS has an all-weather potential.

If "IR PWI" comes into fairly wide use, the equipment's range could be increased, particularly against aircraft with low IR emission characteristics. It would not require equipment modifications, but minor and inexpensive modifications of the aircraft themselves. Investigations have shown the extension of a tailpipe or the elimination of some heat shielding can markedly increase IR emission.

Preceding the discussion of the Aerojet system, progress reports of other manufacturers in the PWI field were given. Bendix reported it is currently engaged in an analysis of operating problems and their effects on PWI hardware for the Air Force. AF is interested in some sort of system based on the requirements of Mach 3 aircraft and operating altitudes of 100,000 feet. The first portion of Bendix's feasibility study is due soon under the initial six-month contract.

One requirement of the contract is that the company arrive at one of three conclusions: A system is feasible under the AF's requirements; a system is not feasible; or no conclusion. In any event, it is likely that an additional six-month contract will be awarded to Bendix, but at the end of that period, the company must reach one of the first two conclusions: a system is, or is

not feasible. One of the problems Bendix has encountered is the difficulty in obtaining a statistical model with sufficient traffic flow to use as a base for its investigations.

Hughes reported that "within the present state of the art, it's (PWI) not operationally feasible," and continued to stress an improved air traffic control system.

Raytheon disclosed its system might be "flyable in less than a year." It will definitely continue along the lines it has previously discussed, although some of its original planning "might change."

Dr. J. Thomas of Sylvania's Applied Research Laboratory, told of his company's research in the use of ultraviolet rays as a PWI system. Declaring that IR energy has the disadvantages of difficult target discrimination and excessive background noise, the "far" UV wave lengths have no background below 40,000 feet, the source is monoenergetic, and the UV energy may be pulsed in micro-seconds for very high information rates. He also said that good photon detectors for UV are commercially available.

Range of the UV system with available commercial equipment was stated to be approximately five miles with a 100-watt mercury source. Dr. Thomas also said that one disadvantage of UV is its scattering characteristics.

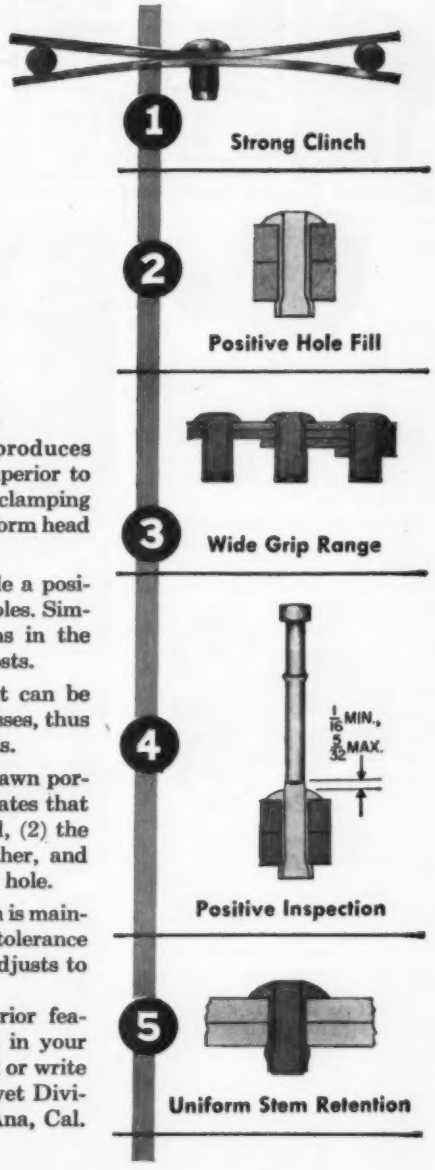
A report on purely exploratory studies by Radio Corp. of America into use of C-Band weather radar as a source of proximity warning produced an entirely new area of airline interest in the search for PWI equipment.

Although no policy decision has been made by RCA to proceed beyond this study stage into development of prototype equipment, it was evident that airline opinion strongly supports such a step. The approach here would be to use the radar as a medium of detecting "intruder" aircraft, but not to rely on scope presentation or scope monitoring by pilots to "receive" the signal.

Instead, a separate black box, probably a short ¼ ATR package, would be used to add separate radar refinements for the PWI job and produce a "where to look" range and azimuth signal for the pilot in the cockpit. Among technical approaches being considered to adapt the radar for the new role would be time-shared circular polarization, to distinguish an "intruder" from rain clutter, and improved circuitry, to provide better target definition for the PWI function.

Assuming RCA decides to pursue the radar PWI solution into the prototype development stage, airline technicians feel it probably would take six to eight months before evaluation equipment would be available. However, based on its expected size, such a device would be in about the $1,500-per-unit class. This compares with an estimated $3,000 for the 30-pound Aerojet device which a number of major airlines hope to be able to evaluate late this year.

Five reasons why Cherry "700" rivets* give you superior fastening



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Circle No. 22 on Reader Service Card

SAC Silver Jubilee Newsreel

BY JACK PATTON

ON THE WAY
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LIKE SEARS & ROEBUCK!
NEXT CAME AN UNPRECEDENTED CATALOG OF FLAT RATE PRICES FOR SERVICE.
ZOUNDS... MOTHS!
IN '46, RED-HEADED JIM LOCKART WAS HIRED AS TREASURER. HE'S NOW VP-SERVICE.
GEEZ!
WOW!
AND 30 ACRES OF RAMP
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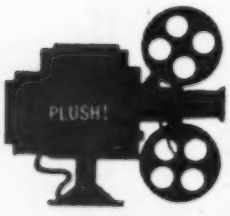
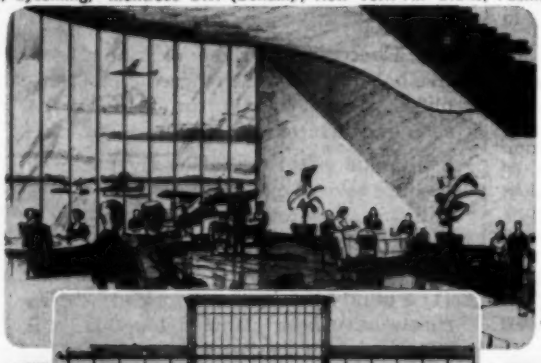
AC, Aeroquip Corp., A. P. Parts Co., Bendix Products Div., B. F. Goodrich, Canadian P & W A, Delco-Remy, Eclipse-Pioneer, Glidden Co., Gould Nat'l Batteries

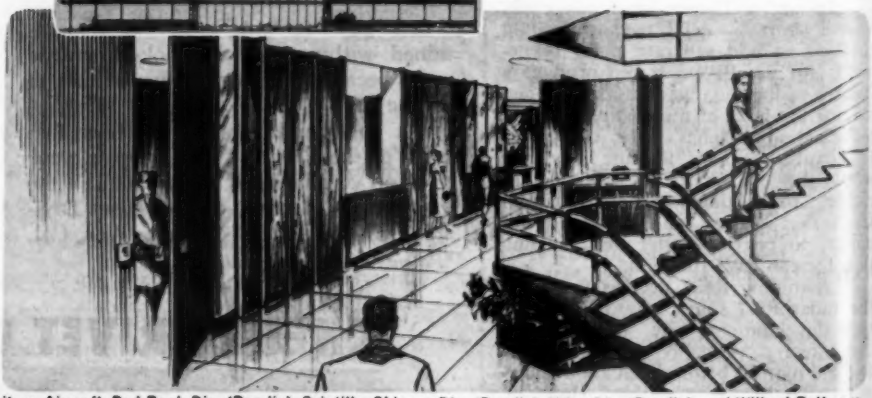
Here, where SAC gained fame as business flying's "Biggest Service Station", the city of Dallas now has built a great new airline terminal. In a sense, this is "hallowed ground"—we trust the mighty airliners treat it kindly!

Grimes Mfg. Co., Hamilton Standard, Lycoming, Montrose Div. (Bendix), New York Air Brake, Pacific Div. (Bendix), Packard Electric, Pesco



Across the field, SAC is building an air-conditioned terminal of its own—plushest in the land. From its beautiful Skyview restaurant to its elegant lobby, lounges, and flight operations room, here is dynamic proof that business aviation Has Arrived. It will open this fall—and you are invited.





Pioneer Central Div. (Bendix), Pratt & Whitney Aircraft, Red Bank Div. (Bendix), Scintilla, Skinner Div. (Bendix), Utica Div. (Bendix), and Willard Batteries

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Air Force launches jet training with T-37A

by William O'Donnell

BAINBRIDGE AFB, GA.—Air Force took a major step in all-jet operation when 20 student pilot officers were introduced to the Cessna T-37A in primary training at Bainbridge Air Base, Ga. This marks the first time USAF student pilots have flown jets in primary training.

The students previously had completed 30 hours in the piston-engine Beech T-34. They will receive 150 hours in the T-37 and 250 academic hours before graduating in March.

The move to the T-37 is part of Project Palm, Phase VIII employment and suitability testing of the jet trainer for the mission for which it is designed. Other student pilots at the base will begin regular training in the jet beginning in January.

Project Palm marks the first time the Air Training Command's Flying Training Air Force has been involved in an aircraft evaluation. The project was recently moved from James Connally Air Force Base, Waco, Tex., to Bainbridge, a civilian contract school operated by Southern Airways Co. It is one of AF's seven contract schools.

Lt. Col. Elmer L. Masters, commander at Bainbridge, said that the flying of the first student in the T-37 "is a historic occasion, and we at Bainbridge are proud to have been selected for the training site." He said that the training program is expected to move along much the same as the base's present program with T-34s and T-28s.

"We are simply switching from piston-engines to jet-engines," he said.

The student pilots for Project Palm are a hand-picked cross-section of all student pilots. The 10 civilian instructors were selected from the seven contract schools.

Training in the T-37 includes 80 hours of contact proficiency flying, 20 of navigation, 15 of aerobatics and 35 of instrument flying. Academic training includes 20 hours of principles of flight, 36 of physiological training, 50 of navigation, 15 of flight instruments, 15 of flight planning, 27 of weather, 15 of aural and visual code and three of flying safety.

If the evaluation proves successful the T-37 will become the Air Force's standard primary trainer.

Both the instructors and students in Project Palm are enthusiastic over the jet training. Maj. Angelo J. Boutselis, project officer for Palm, said that the mere presence of the jet has added "motivation" to the students. He pointed out that the side-by-side seating and the twin-engine safety make it especially suitable for primary training.

J. W. "Mutt" Weaver, director of flight training, said that 10 of the base's instructors (not counting the Project Palm instructors) have checked out in the T-37 and that four have been upgraded. There are 140 flying instructors at the base. Total student enrollment at one time is about 390—a class of about 80 graduates every six weeks.

The T-37 has been tabbed by instructors as one of the easiest aircraft to fly. It is sensitive to control, rolls easily.

Students were expected to average about nine hours of flight instruction in the jet before solo but the first student to solo needed only seven hrs. and 10 min.

"A couple of the students were ready to solo in five hrs. but we wanted to be sure since this is the first time the aircraft has been used for training," one instructor said. "The biggest problem seems to be the tendency to 'overcontrol.' This makes for 'porpoising' on takeoff, and there is a tendency for the plane to float on landing," he said.

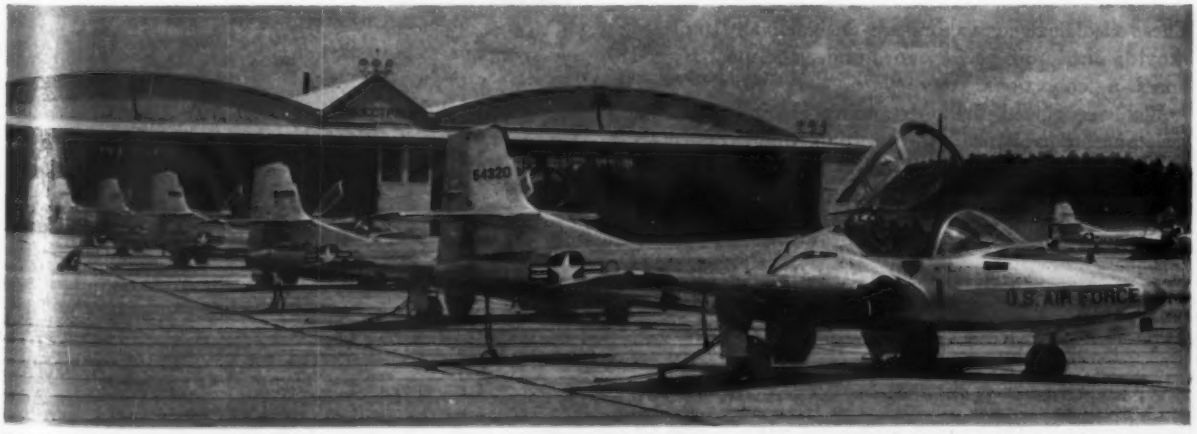
Before flying in the jet itself, students are given five hours in a Link ME-1 trainer. The trainer has the cockpit arrangement and instrumentation of the T-37. It has built-in "vertigo" and the students actually get the feel of flying.

"Ultimately," Hugh W. Davis, general manager of Southern Airways school, said "we will have all jets here. We hope to introduce the students to flying in the T-37 and advance them to the Northrop T-38 supersonic trainer."

First AF student pilot solos after 7 hrs., 10 min.

First student to solo in the T-37 is 2nd Lt. James A. Riggs, Jr., of Richland, Wash. The 24-year-old student pilot officer made his flight after only seven hrs., 10 min. dual instruction. Solo flight lasted 25 min., consisted of two touch-and-go landings and a full stop.

Distinction of being the first Air Force student pilot to fly in the T-37 goes to 2nd Lt. Thomas W. Beaghen. Beaghen, who is 23, is a 1956 graduate of Hobart College, Geneva, N. Y. where he received his commission following completion of Air Force ROTC training.



CESSNA T-37A primary jet trainers are being used for Phase VIII testing as part of Project Palm at Bainbridge AFB.

Vertol 44: executive-cargo copter

by George Shaw

OPERATING COSTS of the new Vertol Model 44 executive-cargo helicopter have been reduced to a level comparable to other transport-type aircraft.

Vertol Aircraft Corp. says extensive studies have shown the civil version of the H-21 military helicopter costs $189.24 an hour to operate, based on 800 hours utilization. This includes crew costs, fuel and oil, maintenance, spares, insurance and depreciation. Based on 200 hours utilization, the rate drops to $126.46 per hour.

Maintenance costs, including rotatable spares, accounts for only $42.61 of the hourly rate, a significant reduction for transport helicopters, and the company expects these costs to be sharply reduced as more helicopters are put into civil operation.

The 44 is an improved version of the H-21 Workhorse, veteran of more than 100,000 hours service with the U.S. Army and Air Force, the Royal Canadian Air Force and the French Army and Navy. Three configurations are being offered, ranging from the 44A, a 19-passenger transport, to the plush executive 8-passenger 44C. The 44B offers airline-type seating for 15 passengers.

VERTOL 44: Improved version of H-21 Workhorse.

Both the 44A and 44B are quickly convertible to cargo use. Seats can be folded against the bulkhead or completely removed in minutes.

The company calls the 44's passenger cabin "the largest available in any transport helicopter on the market today." It is 20 feet long, 66 inches high and 68 inches wide at the midpoint of the fuselage. Any cargo that will fit through the loading doors can be accommodated, and in numerous cases the H-21 has transported cargo that extended several feet out of the fuselage.

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Vertol field engineers have monitored operational and maintenance problems of the H-21 in all parts of the world to establish criteria and specifications for the 44. In operations with the French Army in Algeria it was shown that the H-21 performed routinely at temperatures up to 130° F, while in operations in Alaska, northern Canada and Labrador it proved its ability to perform at temperatures to —65°F.

Because of the tandem rotor design, the Vertol 44 has an exceptional amount of allowable travel of CG. Placement of passengers or cargo is almost unrestricted, limited only by the exercise of proper judgment. Passengers can walk about freely while in flight and cargo can be loaded or unloaded at terminal points without the necessity for protracted computations and juggling.

Vertol officials cite a long list of applications of the 44, while at the same time stressing that full utilization of the craft can run almost the full range of the operator's imagination.

In addition to normal cargo and passenger transport the 44 and H-21 have towed ships as large as the 3,000-ton LST at a speed of 5 kph; carried entire bridge sections, using the external cargo sling, and flown support operations for the DEW-line in Canada and for the Texas Tower radar warning stations off the Atlantic coast.

On isolated construction projects in the far north the 44s have transported heavy, bulky parts and sections slung beneath the craft that weighed up to 5,000 pounds. In such cases the same job would have taken weeks if transported by surface vehicle, while the helicopter took hours.

All models of the 44 have identical pilot cockpit arrangements, with a connecting doorway for easy access to the passenger cabin. Access to the cabin allows the pilots to communicate with passengers or check cargo in flight, eliminating the need for a flight attendant.

The H-21 proved so successful in combat operations against the rebels in Algeria that the French Army has taken delivery of 50 of the craft, with another 50 on order. The West German Army has ordered a number of the Model 44As.

Rotor blades on the 21 and 44 are of wooden envelope construction, with a tubular steel internal spar, proven in more than two million blade-hours as being rugged and durable beyond the orginal design life. Company officials say the blade can be maintained and repaired in the field by the operating activity and returned to service promptly, a desirable feature in remote military and civil operations.

Current life limit established for the blade by CAA is 2,500 hours, with service tour limit of 750 hours. A steel and aluminum blade is offered as optional equipment and an all-steel blade is in the final stages of development.

The company has readied a 44A in preparation for a swing around the country on a demonstration tour. Details of the tour haven't been announced, but it is expected to start as soon as a model of the plush executive 44C demonstrator is completed. A portion of the company's Morton, Pa. plant has been allocated to production of the commercial models.

Piper Comanche gets CAA type certificate

Following close on the heels of its recently released Apache series, Piper has developed another business-executive type airplane—the single-engine, four-place Comanche. The Comanche received a CAA type certificate June 20, after a full year of exhaustive tests, and the first production model will roll off the line late this month.

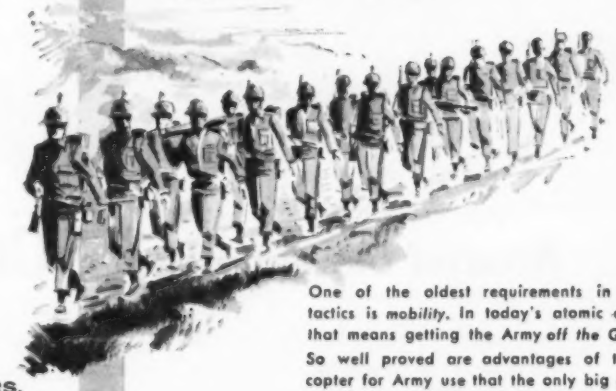
The low-wing, all-metal plane features a laminar flow wing which permits the 180 hp Lycoming engine to deliver relatively high cruising speeds at low power settings. Also embodied in the design are the swept rudder and one-piece stabilator used on fighters.

Deliveries probably will not be made to distributors until late fall, as the first eight Comanches will be used as demonstrators, and for accelerated field tests. Target price for standard models is $13,500, with a number of variations available to fit the needs of the operator.

Military tactics today demand

AIR mobility for GROUND forces

The Army H-23C, built by Hiller, is currently in widespread service.



One of the oldest requirements in military tactics is *mobility*. In today's atomic concepts, that means getting the Army *off the Ground*.

So well proved are advantages of the helicopter for Army use that the only big question now is how to reduce operating costs so that *more* helicopters can be used by *more* units!

The Army H-23D now in production and scheduled for delivery this year represents a major step forward in the goal of attaining lower costs through longer service — 1000 hours — between overhauls.

400 HRS.

The Army H-23C

1000 HRS.

The Army H-23D is the first helicopter designed to incorporate the Army's concept of a 1000 hour overhaul cycle on major components.

HILLER HELICOPTERS

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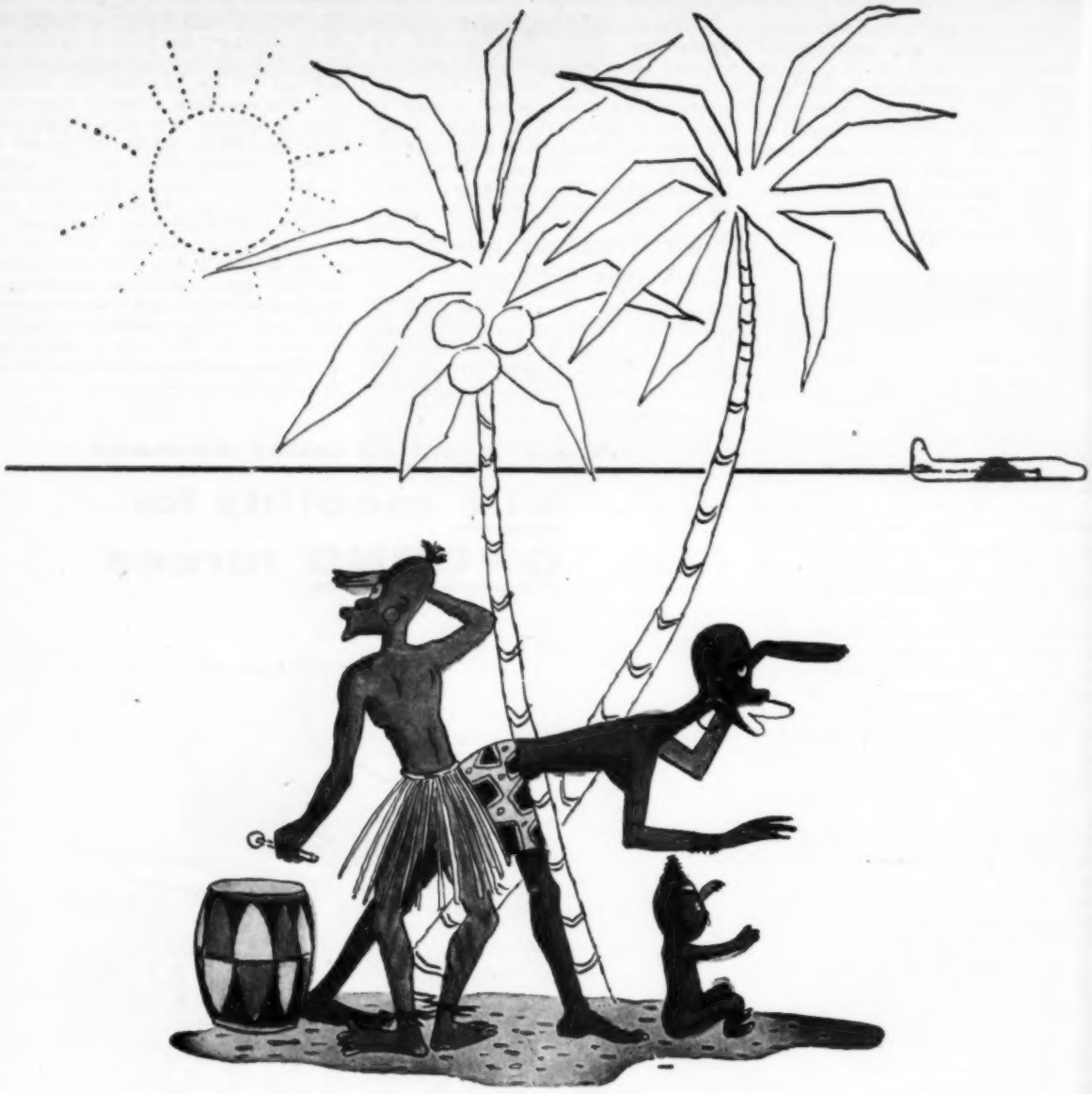

Around the equator 1,800,000 times!

Passengers on the scheduled air fleets of the world last year logged 45 billion miles – enough for one passenger to fly around the equator more than one and three-quarter million times. This figure represents a gain of 16% over total passenger miles flown in 1955. And this amazing record is expected to be broken again in 1957.

As more and more people fly more and more miles, new and better planes are being developed to serve them. To keep these planes flying, operators know they can rely on Esso Marketers for the finest in modern aviation fuels and lubricants—perfected through years of research – and for the finest in uniform, safe and efficient petroleum service along the airways of the world.

8 OUT OF 10 OF ALL THE WORLD'S INTERNATIONAL AIRLINES USE

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AVIATION PRODUCTS

Chilean airlines undercut IATA rates

by Anthony Vandyk

ONE OF THE MOST FANTASTIC fare situations in the world exists between the U.S. and the west coast of South America. IATA fares are being undercut by almost 50% by a couple of Chilean airlines. These carriers, Cinta and Ala, charge $394 roundtrip from Miami to Santiago, as compared with the IATA tourist fare of $678.

No. 1 competitor for Chilean traffic is Cinta, which started operations six years ago as an air taxi service using Bonanzas to transport tourists to Chile's lake region. Today Cinta operates a twice-weekly DC-4 service from Santiago to Miami and will very soon make New York its northern terminal.

Cinta is concentrating on building up traffic on its cut-price service to the U.S. but it has plans to operate to the east coast of South America and on to Europe, with Rome as a possible terminal. The airline recently obtained the financial backing of Compania Sudamericana de Vapores Chiles, a well-established steamship company, and thus has the means to implement its plans.

Competing with Cinta for traffic between the U.S. and the West Coast of South America is Ala, another Chilean airline with substantial financial backing. A division of Compania Salitrera de Tarapaca y Antofogasta, a giant nitrate company, Ala operates a weekly Constellation flight up the west coast from Santiago to Havana with connection by Cubana to Miami. It also has two C-46 flights to Panama connecting with A.P.A. DC-4 services to Miami. By using the latter schedules the passenger pays only $183 one-way against the $219 Constellation fare and the $368 IATA Santiago-Miami fare.

Specializing in cut-price operations between Miami and Guayaquil-Lima is TAN, which has its headquarters in Honduras. This airline operates a thrice-weekly C-46 service to the west coast of South America via Central America. Its roundtrip fares from Miami to Guayaquil and Lima are $198 and $270, respectively, compared with the IATA tourist fares of $351 and $473.40, respectively. Another C-46 operator that is planning to get into the U.S.-west coast of South America is the new Peruvian airline, Aerovias Peruanas.

While the C-46 is not the most luxurious of aircraft and cannot compare speed-wise with the DC-6 and DC-7 equipment operated by Braniff and Panagra to South America, it is adequate for the countless potential travelers who are prepared to sacrifice a few hours to gain a few hundred dollars. The operations of the cut-price carriers between the U.S. and the west coast of South America (and REAL's low fares to Brazil and Argentina) present a real problem to the IATA airlines—one that is going to be extremely difficult to solve.

Russia's IL-18 looks like Lockheed Electra

RUSSIA'S ILYUSHIN IL-18 Moscow turboprop transport looks a lot like Lockheed's Electra design. Its four 4,000-hp Kuznetsov engines give it a cruising speed of 400 mph. Moscow can carry up to 100 passengers.

BRIEFS

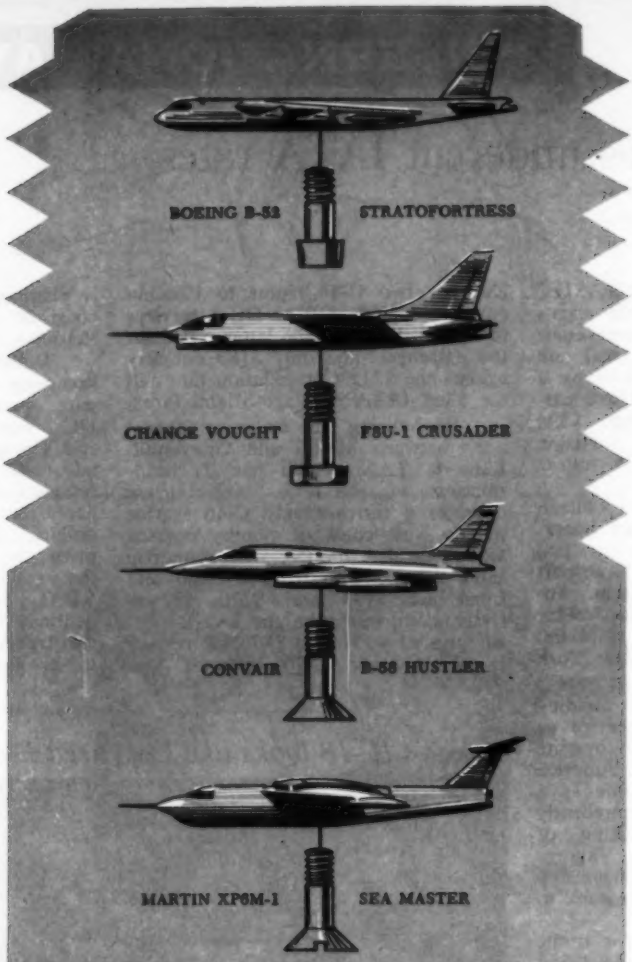
Turk Hava Yollari, Turkish Airline, has ordered five Viscounts for delivery starting in December. BOAC has taken an interest in the carrier as part of the transaction . . . **Ansett Airways** of Australia has ordered eight Convair 440 Metropolitans, bringing its total Convair fleet to 10 aircraft . . . **KLM Royal Dutch Airlines** has ordered a Lockheed L-1049H Super Constellation and an additional DC-7C.

South African Airways plans to start service from Johannesburg to Perth, Australia, within the next few weeks . . . **Misrair** of Egypt has ordered two more Viscounts while **Eagle Aviation,** British independent, has cancelled its order for three of the turboprop planes . . . **Philippine Air Lines** is negotiating to buy a batch of Scottish Aviation Twin Pioneers . . . **Air France** has introduced Super Starliner equipment on the Paris-New York route . . . Merger of Italy's **LAI** and **Alitalia** is not likely to be accomplished much before the end of the year.

Tarom, Rumanian carrier, has started a twice-weekly service from Bucharest to Copenhagen and Stockholm via Prague and East Berlin . . . **H. D. Et M (Aviation) Ltd.** of Shoreham, England, announces that the joint F. G. Miles/Hurel-Dubois H.D.M. 106 light transport is named Caravan and the H.D.M. 107 light assault transport the Aerojeep . . . Britain's **Saunders-Roe Ltd.** has sold ten of its Skeeter two-seat helicopters with DH Gipsy Major 215 power plants to the armed forces of western Germany . . . **Swissair** has increased its Zurich-Tokyo service to twice weekly . . . **Cathay Pacific Airways** has inaugurated a weekly Hong Kong-Phnon Penh, Cambodia, service with DC-4 equipment. It will start service to Kuala Lumpur, French Malaya, in August . . . **Aviaco,** Spanish independent, is reported interested in buying a batch of Fokker F-27 Friendships. The company currently operates five Bristol 170s, eight Languedocs and three Herons. Nine more Herons will be delivered shortly . . .

Philippine Air Lines plans to operate four Viscount flights weekly between Tokyo and Manila via Taipei and Okinawa starting in October providing that it obtains Japanese permission by then . . . **Trans-Australia Airlines** has taken an option on two Sud-Aviation Caravelles for delivery in April and May 1960 . . . **Ansett Airways'** first Convair 440 Metropolitan has reached Australia and gone into immediate service on the Melbourne-Sydney-Brisbane-Proserpine route. Another is due for delivery in September.

Central African Airways' application for license to operate chartered DC-4 aircraft (from **SAA**) on coach-class service to London was turned down by the British air licensing authority after objections had been lodged by the independent operators, Hunting-Clan Air Transport and Airwork. The latter jointly operate a coach-class "Safari" service between Britain and the Central African Federation.



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New competition compounds airlines woes

Public must foot $100-million bill unless fare increase is granted, industry spokesmen tell CAB

by William V. Henzey

WHILE THE GRAVY TRAIN of new airline route awards was applauded by virtually all a year ago, the airline industry's current financial plight emphasizes the truism that "everything must be paid for" including new competition.

Whether the Civil Aeronautics Board grants the industry's bid for a 6% fare increase or not, the fact remains that the public has inherited an annual bill of approximately $100 million which must be paid sooner or later, in one fashion or another.

That is a rough estimate of the added monies needed collectively by carriers forced to share historic routes with new competitors and by the new competitors who are forced to battle for traffic in markets with established companies.

The industry's proposal for a 6% fare boost which would add upwards of $70 million annually to airline revenues was the relatively painless way suggested whereby the non-complaining public might pay some of the cost of the government's much publicized liberal route policy of the past few years.

If the fare hike is rejected, the airline industry is unanimous in the belief that the taxpayers generally will have to foot the bill through subsidy payments.

All of this became apparent at a two-day oral argument before CAB on July 31-August 1, in the Suspended Passenger Fare Case. Through the maze of statistics and accounting principles which have marked the stormy case since its inception in March, came the clear argument of the CAB staff that airlines were operating too many schedules and the equally-clear rebuttal of the airlines that new competition by its very nature, forced competitors to vie for traffic through added capacity.

The purpose of competition, said United Air Lines' counsel H. Templeton Brown, is for one company to get a share of the competitor's business. If you're running enough planes for your own business, Brown continued, you need added capacity to accommodate the new traffic you expect to get from your competitor.

The alternatives, Trans World Airlines' attorney George Spater added, are either the European system of "pooling" which is repugnant to American business, or straight out-and-out violations of the anti-trust laws.

Carrier most criticized in the CAB fare case for alleged "over-scheduling" was Eastern Air Lines which, according to CAB attorneys George Cosson and Edwin I. Colodny, virtually flooded the New York-Atlanta-south market. If, in the face of declining load factors, EAL continued to add schedules, there would appear on the surface, at least, some merit to the CAB staff argument.

But listen to Eastern's side. EAL counsel Harold L. Russell told the Board that Delta Air Lines and Capital Airlines have been added to the markets involved. In the CAB cases in which those route awards were made, Eastern emphasized to CAB that it was committed to much new equipment which, according to EAL, minimized or eliminated the need for added competition.

When, however, CAB added the competition, Russell said, it didn't mean that EAL was to sit back and let the competitors have the markets without a fight. Similarly, Delta and Capital make no pretense that they have enough schedules on the route and admittedly will add more as aircraft becomes available.

The CAB staff argues back that management can add schedules at will but should not, if their judgment proves wrong, be compensated by a passenger fare boost or some other form of monetary relief.

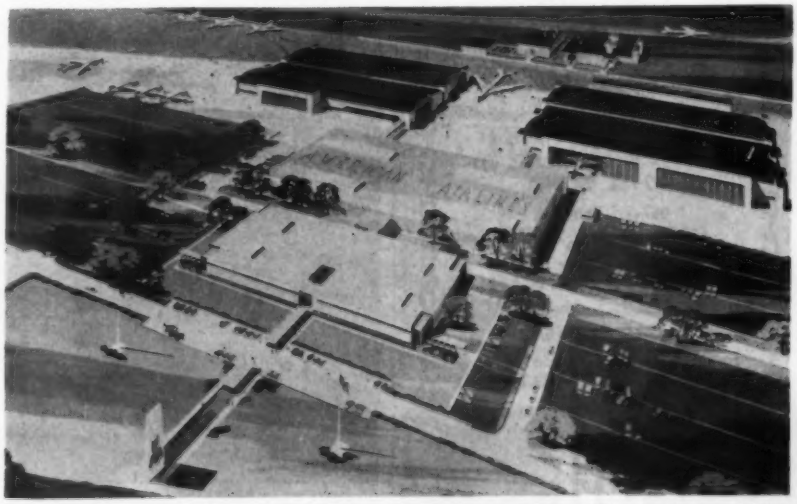
But CAB Member Chan Gurney, a conservative on the five-man Board responsible for the most of the route awards several years ago, asked where the line is drawn. When is management's judgment wrong? What is a "reasonably attainable load factor" below which a carrier may be accused of over-scheduling?

And TWA's Spater chimed in that the Board's staff "wants all the benefits of competition but none of the problems."

When the trunk airline industry was on subsidy, CAB had virtually an unchallenged hand in answering the questions posed by Gurney. It only had to pay subsidy for what it considered "efficient and economical operations." Now, for the first time, it is confronted with those questions by an unsubsidized industry operating in a critical financial period under a souped-up competitive route structure.

In short, CAB and the industry have changed from "father and son" to brothers. Both must share in the re-

AA's Tulsa base slated for 1959 completion



COVERING some 230 acres, American Airlines' proposed $20-million jet base at Tulsa will have hangars large enough to house Boeing 707s and Lockheed Electras that go into service in 1959. Included are a jet engine overhaul shop, engine test cell, office and storage areas.

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sponsibility for continued progress and development of the industry. And unquestionably that responsibility has hit a peak unparalleled in aviation industry.

It was Spater who noted that the Government agency must look at the industry as a whole and, if extreme instances of over-scheduling in competitive markets appear, utilize Section 411 of the Civil Aeronautics Act which empowers the Board to act against any company it feels is guilty of unfair competitive practices. But don't, the TWA lawyer emphasized, penalize the industry as the CAB staff suggests by denying reasonable price increases.

While the lines in this dispute have been drawn between the industry and the Board's staff there is no criteria, short of CAB's vote in the 6% fare case to judge which side the present five-man Board adheres to. It is apparent, however, that the industry is not faced with a "liberal" Board such as reigned under Ross Rizley and liberal Democrats Josh Lee and Joseph P. Adams.

The philosophy of that Board was to grant extensive new routes, build up the little carriers, and push expansion of low-fare coach service. Though commendable in many areas, that philosophy is akin to buying on credit. Now the time has come to pay for the extravagance and it is up to a Board 60% different in make-up to handle the bills.

Hold-overs Gurney and Denny are conservative Republicans. Chairman James R. Durfee is schooled in public utility law and the industry has expressed no lack of confidence in his ability to cope with the tough financial days ahead. Democrats G. Joseph Minetti and Louis J. Hector are sticklers for detail and study every case religiously.

As American Airlines counsel Howard C. Westwood told the Board, the industry is in for a "rough winter." It is up to the "new Board" to see that it doesn't have a "very sick industry" on its hands for years to come.

IATA still committed to 'thrift' service-Hildred

Plans for institution of a "thrift" class service over the Atlantic next year are in no way disturbed by the desire of transatlantic carriers for a 5% surcharge on North Atlantic fares, according to Sir William Hildred, director general of the International Air Transport Association.

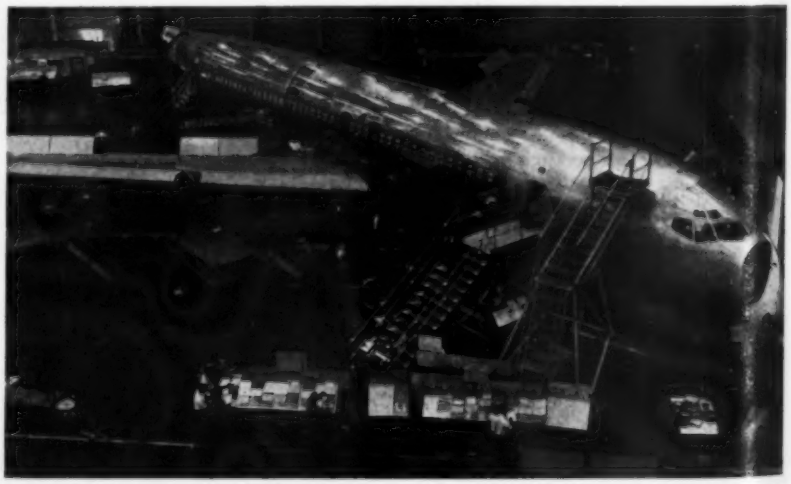
Introduction of a "thrift" service "is governed by a formal resolution passed in June 1956 at the Traffic Conference at Cannes," Sir William said. "That resolution was subsequently approved by the interested governments. That resolution asserted that a new low-fare tourist-type service may be established over the North Atlantic by any member as from 1st April next, and stipulates certain fare levels and seating pitches.

"This fact remains regardless of what views airlines and their governments may have expressed, or may hold, in regard to the 5% surcharge.

"The international airlines are used to trying to get a quart out of a pint pot. They must now try to get a quart out of a pot which has shrunk to less than pint size. There is, of course, no crystal ball which can forecast what exactly will emerge from a Conference of more than threescore competitively-minded airlines, or which can reveal what may be the further reactions of their respective governments."

Consideration of "thrift" class service at the next Conference in Miami must clearly proceed on the basis of the June, 1956 resolution, Sir William concluded.

PAA Jet Stratoliner nears completion at Boeing



AMERICA'S FIRST production jet transport, the Boeing 707 number 1, which will be delivered to Pan American World Airways, receives its 43-ft. aft fusleage section at Boeing's Renton, Wash., plant. The section was built by Ryan Aeronautical Co. Delivery of first aircraft to PAA is slated for late next year.

Picture for 1975: 1,500 transports, 34% large jets

by Albert W. Bentz

THE DOMESTIC common carrier fleet in 1975 will total about 1,500 aircraft—34% large turbojets, 28% medium turboprops, 13% medium jets, 12% small turboprops and the remainder piston-powered transports. An additional 300 aircraft will comprise the U.S. international, airfreight and nonscheduled airlines fleets.

Major change in the general aviation fleet will be in numbers, but there could be a major shift to turbine-engine aircraft if they have VTOL or STOL capability combined with all-weather utility, require little skill to operate and the price is low enough.

These are the two principal conclusions of the Cornell Aeronautical Laboratory, Inc.'s study of civil aircraft characteristics forecast submitted to the Presidential aviation facilities planning group.

Flight characteristics of the common carrier fleet should not differ radically with transports now existing and on order, "with two exceptions," the report states. The exceptions are continued development of VTOL and STOL, and possibility a very large supersonic transport might appear on the scene within the next 15 years.

"Present design knowledge is not adequate to produce a supersonic transport economically competitive with subsonic airplanes," the report says, "but the required extension, while difficult to attain, is not great. Therefore, some common carrier supersonic transports may appear in operation between 1970 and 1975."

This would be a 1,200-knot aircraft weighing half a million pounds gross at takeoff. Cruising altitude would be 50,000 feet or higher. But their terminal area flight characteristics would be comparable to large subsonic jets.

Commercial operation of nuclear-powered aircraft is "very unlikely" in the next two decades, CAL says.

The study found that the evolution of the commercial fleet "will be characterized by a shift to turbine-powered aircraft of all sizes, and a trend toward use of larger aircraft than are used today over all stage lengths of the trunk lines."

It is not anticipated that runway lengths in excess of 10,000 feet will be needed, even for the largest transports. Advent of STOL and VTOL aircraft will be capable of safe operations from 600-foot or shorter landing strips. The researchers believe this type transport will have a capacity of 50 or more passengers, with cruising speeds and altitudes comparable to conventional transports.

The study envisions a short-range, high-capacity transport that could carry 294 passengers 250-400 miles. It would be on the order of the DC-8, with similar performance characteristics and only a moderate thrust increase.

Heavier landing weight (with additional passengers replacing fuel used on longer stages) would require increased effectiveness of wing flaps or other high lift devices, the report points out. Net empty weight would be increased 16,000 pounds by structural beefing and additional seats.

The report treats briefly with helicopters, dividing them into two transport categories: 2-8-passenger local taxis and 30-50-passenger scheduled

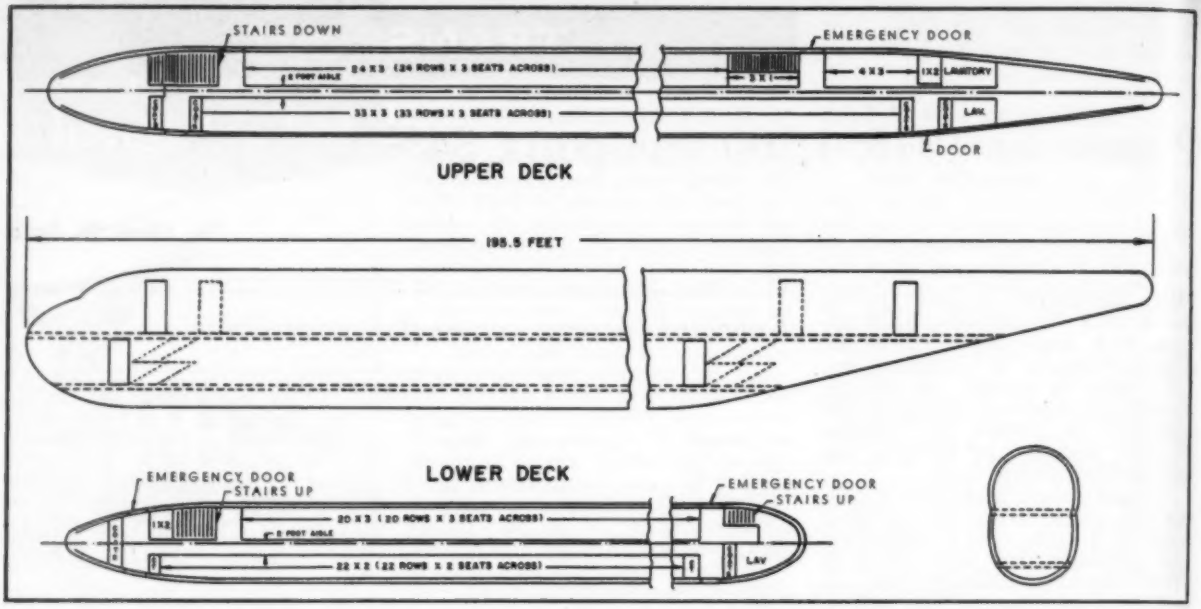
Estimated common carrier fleet composition

A/C Type	1960-62* No. A/C		% of Fleet		1965 No. A/C		% of Fleet		1975 No. A/C		% of Fleet	
Small, recip.	331	523	23.0	36.5	254	509	20.0	41.0	131	305	9.0	21.0
Small, T. P. §	192		13.5		255		21.0		174		12.0	
Medium, recip.	474	743	33.2	52.1	109	546	8.8	44.0	53	663	3.6	45.0
Medium, T. P.	182		12.7		300		24.2		418		28.4	
Medium, T. J. §	87		6.2		137		11.0		192		13.0	
Large, T. J.	163		11.4		184		15.0		510		34.0	
Total	1,429†		100		1,239‡		100		1,478‡		100	

* Estimated from end-1956 airline-furnished data.
† Includes international and overseas (116-250 A/C, approx.).
‡ Domestic only.
§ T. P. = Turboprop. T. J. = Turbojet.

Characteristics of general aviation airplanes

Type	Range of takeoff gross weight thousands of lbs. 1957	1965	1975	Range of cruising speed, knots 1957	1965	1975	Range of cruising altitude thousands of ft. 1957	1965	1975	Range of minimum approach speed, knots 1957	1965	1975
Light Single	1-2.5	1-2.5	1-3.0	60-100	70-120	80-250	0-10	0-10	0-20	50-60	50-60	40-70
Piston	1-2.5	1-2.5	1-2.5	60-100	70-120	80-150	0-10	0-10	0-10	50-60	50-60	40 70
Turboprop	....	....	1.5-3.0	.....	.....	150-250	....	....	5-20	.....	.....	60-70
Heavy Single	2-8	2-15	2-15	100-150	120-300	150-500	0-10	0-20	0-30	60-95	60-100	60-100
Piston	2-8	2-8	2-8	100-150	120-200	150-250	0-10	0-10	0-10	60-95	60-100	60-100
Turboprop	....	....	3-8	.....	.....	200-350	....	....	5-20	....	....	60-100
Turbojet	....	4-15	4-15	.....	200-300	300-500	....	10-20	10-30	....	75-100	75-100
Light Twin	3.5-10	3.5-10	3.5-10	120-180	150-500	150-550	0-10	5-25	5-30	60-100	60-110	60-110
Piston	3.5-10	3.5-10	3.5-10	120-180	150-250	150-300	0-10	5-20	5-20	60-100	60-100	60-100
Turboprop	....	....	6-10	.....	.....	200-350	....	.....	10-20	.....	.....	70-100
Turbojet	....	5-6	5-8	.....	350-500	350-550	....	15-25	15-30	.....	100-110	100-110
Transport	10-50	10-60	10-60	150-300	150-550	150-550	5-25	5-40	5-40	8-100	80-130	80-130
Piston	10-30	10-50	10-50	150-300	150-300	150-300	5-25	5-25	5-25	80-100	80-100	80-100
Turboprop	....	30-60	30-60	.....	250-400	250-400	....	10-30	10-30	.....	90-100	90-100
Turbojet	....	20-30	20-30	.....	350-550	350-550	....	20-40	20-40	.....	100-130	100-130



FUSELAGE arrangement for 294-passenger shorthaul turbojet transport visualized by the Cornell researchers.

interurban carriers. Latter would be a multi-engine turboshaft transport with a cruising speed of 150 knots and having a useful range of 200 to 400 miles. Landing strips 500 feet long with cleared areas surrounding the heliport to permit required angle of descent would be necessary because of uneconomical vertical takeoff and landing.

"A horizontal vs. vertical glide angle ratio of approximately 8 to 1 has been indicated as desirable," the researchers report.

The report visualizes a DC-3 replacement powered by two 2,400-hp piston engines with passenger capacity of 44-52, cruise speed of 250 knots. The Vickers Viscount and Fairchild F-27 turboprops also would fit into the shorthaul category, along with turboprop conversions of the Convair 440 and Martin 4-0-4.

The general aviation VTOL-STOL turbine-powered aircraft probably would have to be built in quantities of 300,000 annually to reduce the price into the range of mass marketing. This aircraft should be technically feasible by 1965, but there will not be a sufficient market without more massive population shifts from urban centers.

"While such developments may well appear eventually," the report says, "they are not foreseen during the 1956-75 period."

The researchers dwelt at length on the development of STOL and VTOL and came up with an estimation of the characteristics of a 50-passenger STOL transport. Its physical characteristics: wing span, 131 ft.; wing area, 1,725 sq. ft.; normal gross takeoff weight, 63,000 lbs.; payload, 10,000 lbs.; passengers, 50 plus crew; engines, two turboprops (4,700 hp each) plus auxiliary power for BLC; cruise speed, 260 knots; cruise altitude, under 6,000 ft.; normal range, 100 mi.; normal runway required, 600 ft.

The report does not envision a small purejet transport "because such aircraft would not be economically competitive with other small aircraft over given (short) stage lengths. This is primarily due to the fact that the block speed would be much lower than the cruising speed. A small turbojet transport, if it did exist, would have performance characteristics similar to that of the medium turbojet."

The medium turbojet described by the study includes the French Caravelle, Comet IV, Convair 880 and the DC-9.

The researchers found that the large turbojet will have lower passenger-mile direct operating cost than medium aircraft over medium and long stage lengths, "if it can be filled."

The medium turbojet will have little block-speed advantage over the medium turboprop on average stage lengths corresponding to short-medium haul operations.

Editor's note: This is the second in a series of articles detailing the special studies prepared for the Presidential aviation facilities planning group. The first appeared in the July 29 issue.

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Boeing favors water injection for jet engines

Boeing Airplane Co. sums up the advantages of water augmentation for the Boeing 707 jet transport this way:

"With water, you can fly cheaper and farther."

The Boeing philosphy takes on added interest because it is selling 707s both with and without water injection.

Boeing's 707-120 series, powered by P&W JT3C (J57) engines, require water augmentation for full gross takeoff and temperature accountability. Boeing's 707-320 series, powered by P&W JT4A (J75) engines do not. One of the advantages claimed for the larger, more powerful and more expensive JT4A engines is that no augmentation is needed to meet required takeoff weights and runway lengths.

But Boeing doesn't look at it this way. In fact, its engineers predict Pratt & Whitney later on will come around to water augmentation for the JT4A design for the simple reason that it will add to the range of aircraft so equipped.

A factor of water augmentation for jet engines is the large amount of water used. It may add up to as much as 180 gallons per engine when used to overcome power losses on hot days. Since pure water is used with no additives it is completely consumed on the takeoff and may reduce the weight of the aircraft up to 6,000 pounds with a corresponding increase in range.

Roughly speaking, water augmentation increases power about 15%, and the quantity of water that may be required ties in with the CAR regulations governing takeoff. For its 707-120, using P&W's latest JT3C-6 engines, which probably develop in the area of 13,000 pounds thrust wet, Boeing's current specifications call for 4,000 pounds of water for full gross of 248,000 pounds at sea level. It is conceivable, however, that regulations may be established which will bring the required volume up to 5,000 pounds for a 100°F day.

Boeing not only proclaims the advantages of water injection, but discounts objections that it is difficult to handle. The company has conducted extensive studies for airlines buying 707 equipment and estimates the cost per takeoff will be approximately $3. This includes amortization on cost of equipment needed to handle the water.

CAB clarifies regulations governing jet transports

Clarification of civil air regulations to govern American and foreign-built jets operated by U.S. airlines has been made by Civil Aeronautics Board in Special Civil Air Regulations SR-422.

The Board rule, effective August 27, will govern all jets and turboprops approved after that date. In effect, it encompasses operation of all turbine transports except the Vickers Viscount.

Final rules set by CAB represent a middle-of-the-road approach to the demands of the Air Lines Pilots Association and the industry as to specific figures to define the takeoff distance, obstacle clearance requirements and climb gradients to be applied to the jets.

Airlines and manufacturers sought a "sliding scale" of figures down to 26 ft. to specify aircraft height at the end of the runway, whereas ALPA strongly sought a 50-ft. dimension in each case.

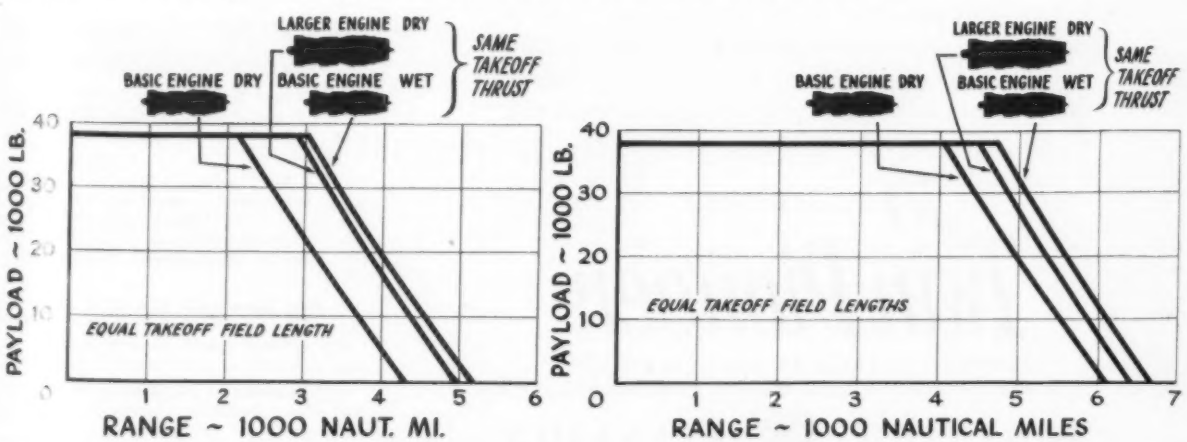
SR-422 calls for a 35-ft. height at end of runway to define takeoff path and requires a 35-ft. obstacle clearance with one foot added in required vertical clearance for each 100 ft. the aircraft progresses from the end of the runway on its intended flight path. The latter is a feature added by CAB subsequent to industry-coordination of the proposed rules.

CAB's new climb gradients are, generally speaking, more stringent than those proposed by both the Air Transport Association and Aircraft Industries Association. Rules provide for at least a 4% steady gradient of climb in the "all-engine-operating" landing climb configuration, the most critical to four-engine jet performance.

Manila is Hong Kong alternate

Air-India International says that Manila is "invariably" the weather alternate for Hong Kong. AMERICAN AVIATION on May 6 said that "Americans have been cautioned about flying Air-India to Hong Kong. The weather alternate for this airline is Canton, in Red China. It hasn't happened yet, but U.S. citizens could be put in quite a spot by landing involuntarily in Red China."

Range extension of Boeing jet transport with water-augmented engines



CHARTS SHOW how range of Boeing 707 jet transport is extended through use of water augmentation. First chart illustrates how wet P&W JT3C (J57) engines will give 707-120 more range than a more powerful dry engine. Second chart shows how similar advantage would be gained by wet JT4A (J75) engines with the 707-320 if water augmentation should be designed for the J75 as it is for the J57.

Lockheed's 'baby jet' to fly in September

Lockheed Aircraft Corp.'s CL-329 "baby jet" will roll out this month and fly in September, according to C. L. Johnson, vice president.

Design provides for either two or four jet engines mounted in pods high on the aft fuselage. The plane will fly first with two Orpheus engines. The later four-engine version will use General Electric J85s.

Lockheed is making the $6-million investment in the plane in the hope of getting military orders. The Georgia Division has been assigned the responsibility for selling the aircraft as well as manufacturing it.

CL-329 will carry 10 passengers and crew of two. Cruising speed will be more than 500 mph and range will be near 2,000 miles.

Douglas prop spinner kit aids WAL transports

The propeller spinner and inner cowl liner kits with which Western Air Lines is equipping its DC-6Bs are expected to pay for themselves in about 18 months, judging by results being obtained from WAL aircraft fitted with the Douglas-designed package.

The airline says the improved cooling of rear cylinders, the kit's principal benefit, enables it to reduce cowl flap drag, increase air speed and establish higher power settings and a higher rate of climb to cruise altitude, all of which result in reduced fuel consumption and longer engine life.

Although Western feels the kit is of particular advantage in its Mexico City operations, especially during take-off and climb-out from the over 7,000-feet-high Mexican airport, the spinner has proved beneficial in the company's cold-weather operations. It tends to keep the propeller dome warm, making reversing operations smoother and more effective.

Western's flight crews have also been surprised to receive passenger comments as to the "dressed up" look the spinners give the airplane and consider this still another, although less tangible, advantage.

The original kits were designed by Douglas in cooperation with Pan American. In addition to Western's DC-6Bs, the package is being used by Canadian Pacific and Northwest.

CAB votes to revoke Capt. Specht's rating

Civil Aeronautics Board has voted to revoke the airline transport pilot rating of Capt. Leonard J. Specht, respondent in a safety compliance proceeding, for violations of Civil Air Regulations while in command of a scheduled airline flight under instrument flight rules January 29 between New York and St. Louis.

CAB said this does not constitute its decision in this case, which will be issued at a later date. The Board's action was taken in connection with appeals from a decision by a hearing examiner of the Board, following a hearing on a complaint against Specht filed by the Civil Aeronautics Administrator.

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TRANSPORT CHANGES

Michael B. Silver has joined National Airlines' public relations dept. **L. F. Weidman** is new district operations manager-Idlewild.

G. M. Morris has been promoted to supt. reservations operations for United Air Lines; **C. K. Allison** moves up to supt. reservations planning, and **V. L. Brown** is new mgr. of space control div. of reservations.

Paul Bewshea is new sales adviser to mgr. (USA) for British Overseas Airways Corp.; **Harry Good** takes Bewshea's former position as sales mgr. (USA).

Alexander L. Mackintosh is new dsm for Pan American Airways at Osaka, Japan.

Jack Ehrhart has been named asst. dir. of publicity for Continental Air Lines.

Jack Bulterman becomes dsm at Chicago for El Al Israel Airlines.

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Informed employes are best employes

by Eric Bramley

WE WERE INTERESTED to hear the editor of an airline house-organ wonder out loud how he should go about convincing top management that a company publication was important —that it was important to keep employes informed about what was going on. This was startling, because we assumed that all managements were well aware that this is a "must." We've noticed that Eastern, Pan American and some others are making special efforts, not only through house-organs but through special publications, to get the word to employes. And an airline public relations expert who has studied the pubrel program of one of the largest U.S. corporations tells us that this company releases practically no information that is not first given to its employes. It works on the theory that informed workers are its best pubrel representatives. Airline managements should note.

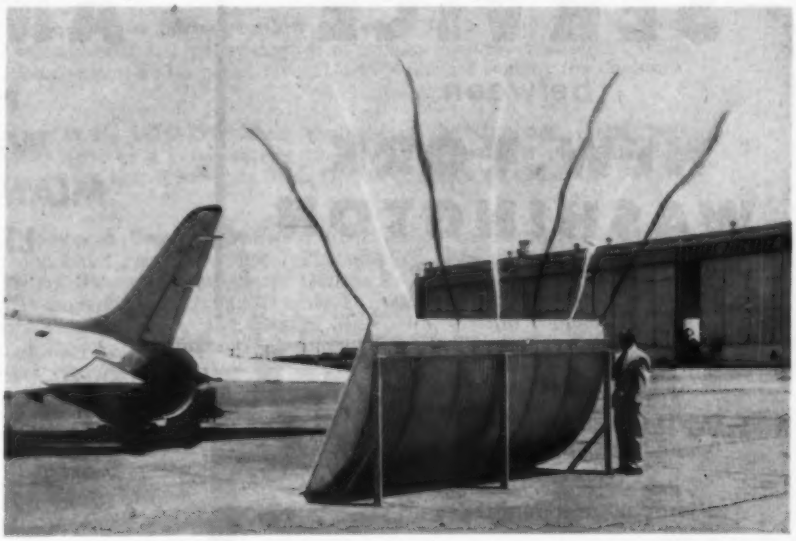
High cost of doing business: Pan American World Airways, which is spending $275 million for 44 jet transports, points out that this is enough money to buy four luxury ocean liners of the United States class. It also amounts to almost 17% more than the cost of all flight equipment now owned by PAA, or more than double its present book value.

Catching up on our reading, we note that the Railroad Public Relations Assn. invited four New York financial news reporters to its meeting to tell the members whether their pubrel programs were good or bad. Evidently the reporters pulled no punches. They said the rails spend too much time bemoaning their hapless fortunes instead of stressing their importance and their progressive accomplishments. Another suggestion was that executives be made more accessible to reporters. Airlines are much more aggressive, they added. Can't help wondering what four aviation writers would tell a meeting of airline pubrel men. Some useful suggestions might result.

What's-in-a-name department: Almost simultaneously, two men stepped up to Delta's ticket counter in Columbia, S.C. One, a Mr. Houston, asked for a ticket to Washington. The other, a Mr. Washington, wanted a ticket to Houston . . . A woman called American Airlines in Boston and thought she'd move into the future when the phone was answered, "Rocket space control." The AAer on the line was John Rockett, chief of space control. His brother Dick has the same phone trouble in Ft. Worth, where he's AA's reservations chief . . .

Recent publicity stunts: To dramatize and symbolize Thai Airways' acceptance of the first Super-G Constallation for Thailand, Lockheed thought it would be a good idea to rent an elephant to pull the plane into position for delivery. Only available elephant, however, was a midget, and he couldn't budge the Connie, even downhill. So Lockheed called in some mechanized equipment to do the job . . . To publicize new Ambassador service between New York and Chicago, TWA, with the Chicago Daily News cooperating, staged the "great pigeon race of 1957." Three "Chicago-based" pigeons were flown to New York and released for the westbound flight. One bird took 20 hrs. to cover the 725 miles home. The second took a couple of hours longer. But the third, which evidently made a few stops en route, didn't show up for 11 days . . .

Jet-blast fence withstands high temperatures



NEW JET BLAST FENCE, designed to solve the problem of jet and propeller blast on airports, has been developed by Lynn Engineering Co., San Francisco. Lynn claims that the fence, called "Air-Curtain," sells for about half the cost of other off-the-shelf fencing and will withstand higher temperatures. Streamers show upward deflection of blast.

Sales, Traffic, Promotion

Delta **Air Lines** will spend $112,500 in 1957-58 on airfreight advertising. National and local campaign got under way last month. Newspapers in 12 major cities are being used, plus magazines with total circulation of more than 800,000 . . . Delta is putting up an electrical display on the Malecon, Havana's ocean front drive . . .

Pan American, doing some of the smartest cargo promotion in the industry, has sent prospective shippers an "export distribution cost analysis." Shipper is invited to fill in his costs of sending a commodity abroad via surface means—transportation, packing, processing, brokerage, storage, insurance, etc. Form is then returned to PAA, which fills in comparable costs via air. A salesman then calls on the prospect . . . PAA has also printed a world marketing map . . .

Second edition of **American Airlines'** "Domestic Air Vacation Sales Tariff" booklet is being distributed to 1,800 travel agents. The booklet, which AA claims is the "only compilation of its scope offered by an airline," lists all vacations, accommodations and prices available through AA. New edition, with information on 61 vacations in 23 holiday areas, covers summer and fall months of 1957 . . .

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TRANSPORT TRENDS

White House is reported to have decided to add Madrid to Pan American's south Atlantic route. PAA submitted four separate route proposals for Madrid service. Reports are that CAB and White House are denying three of them, but will permit the city to be served on flights to Africa. Decision should be announced shortly.

Howard Hughes will appear at CAB public hearings in Washington on Sept. 16. CAB wants the "other side" of what Atlas Corp. president Floyd Odlum said is a "gentlemen's agreement" by which Hughes allegedly promised to give Odlum a proxy to vote Hughes' Atlas holdings. Case centers around question of whether Hughes, who controls TWA, acquired the "power to control" Northeast Airlines through his Atlas stock.

Prices of used transport planes are dropping. An airline that could sell a DC-4 a year ago for $600,000 to $650,000 is doing well today to get $350,000 to $400,000. Some Constellation models have dropped from $1,250,000 to around $900,000. Convair prices can be expected to soften as more become available—American says it will release 10 starting in September. United will probably sell some before year-end. Exception is the DC-3. It's still in demand and still selling as high as $125,000 to $150,000.

Contrary to belief when the stock trust arrangement ended in June, Raymond Marshall has not regained management and policy control of Alaska Airlines. Charles E. Willis Jr., recently elected president, and a board favorable to Willis are making the decisions.

Lockheed has a bigger winner in its L-1049H than anybody in the company would have guessed several years ago. As a cargo carrier convertible to passenger use it has had outstanding success as the best type in its field. Orders continue to come in.

What was behind that big move in Capital Airlines, when Maj. Gen. David H. Baker was elected president and chief executive officer? The question is being asked a lot—but few know the answers. Two things are clear: George R. Hann, the long-time director and big stockholder from Pittsburgh, and Thomas D. Neelands Jr., Wall Street investment broker, are calling the shots, and Charles Murchison, general counsel, lost his powerful spot as chairman of the executive committee. J. H. "Slim" Carmichael, who moved up to board chairman, will continue to be active. Insiders believe the recent move is only the first of a series. One officer learned of the Baker selection only 10 minutes before the board meeting. There is even an indication that before the meeting it hadn't even been fully decided what title Baker would have.

Transocean Airlines is taking steps to strengthen its executive staff and will make some additions shortly.

Foreign governments continue to besiege U.S. with requests for air routes. Here's what will come up in negotiations during the next several months: Philippines, significantly, have asked consultation on new routes—further indication that Philippine Air Lines, which withdrew from international picture a few years ago, is getting ready to expand again. Swiss want new routes to U.S. west coast or to Mexico City. Lebanon requests rights to U.S. and Mexico. Consultations are also asked by Venezuela, Austria and Luxembourg.

There are indications that one of these days Pan American will either sell or lease its Alaska route, which is no longer so vital to its world routes with the advent of long-range equipment. PAA finds the operation costly in these non-subsidy days. Presumably either Pacific Northern or Alaska Airlines would take over the route, which runs to Juneau, Fairbanks and Nome.

INDUSTRY

Lockheed gambles $6.5 million on jet utility transport; prototype set to make first flight next month

Lockheed Model CL-329 jet utility transport prototype, slated for first flight in early September, represents the first flying hardware in industry's competition for military's nod in its "off-the-shelf" trainer/transport competition.

Lockheed's investment in the program, estimated at $6.5 million, is in essence a stepped-down version of Boeing's big gamble with the 707 prototype which subsequently brought the Seattle firm a multi-million dollar order for KC-135 jet tankers.

MODEL of Lockheed's CL-329 in Air Force markings.

In the CL-329 program, Lockheed will produce two prototypes, giving it a healthy "first hardware" edge over its competitors.

On its first flight, the CL-329 will be powered by two Bristol Orpheus engines contributed to the project by Curtiss-Wright. Two engines have been delivered at Burbank, Calif. and a third is scheduled this month.

First flight of the medium utility transport is scheduled to take place at 9 a. m. on September 4, weather permitting.

It will be next spring before General Electric J85 engines will be available for a four-engine configuration. Meanwhile, Lockheed will evaluate the twin-engine arrangement with Orpheus powerplants and it is possible the "baby jet" may be offered in two versions, one twin-engine, the other four.

As an alternative to the J85, Lockheed also is reported to be considering the Fairchild J83 turbojet as a powerplant for the CL-329.

Two Orpheus engines just about balance out four J83s or J85s in thrust. The prototype engines C-W is furnishing to Lockheed develop approximately 4,850 pounds thrust, but TJ37 production engines will produce up to 5,250 lbs. C-W feels that two engines will have economy advantages for commercial purchasers.

Although Lockheed developed the CL-329 to meet Air Force's UC-X requirements, it is organizing a sales program for the small jet in the business aircraft market at a price below $1 million. This will be conducted by Lockheed's Georgia Division since plans call for production of the aircraft at Marietta.

Coroner's jury splits, 5-4, on WAL incident

Five members of a coroners' jury voted for death of undetermined origin and four returned a suicide verdict in the July 25 Western Airlines incident in which a man was blown out of a Convair en route from Las Vegas to Los Angeles. The plane, with a big hole blown in the washroom wall, landed safely at George AFB.

As a result of the incident, airlines are likely to take a close look at airline trip insurance policies. The WAL passenger had bought $125,000 worth of insurance through a company which split the business between two underwriters. One of the policies did not contain a provision refusing payment in event of suicide. The other had a suicide clause.

Some industry lawyers believe that even if suicide were involved, the passenger's heirs would not be able to collect because self-destruction, in a case like this, is against the public interest. However, airlines are giving some thought to the matter, because absence of a suicide clause in policies could lead to a wave of incidents.

Ironically, the WAL passenger had intended to board Blatz Air Lines, a supplemental carrier, at Lockheed Air Terminal on a package tour to Las Vegas. The tour was oversold and six oversales were handled by WAL. Had the man been on Blatz, the insurance—good only on scheduled carriers—would have been null and void.

Frank H. Vosepka, WAL's chief inspector, testified at the coroner's inquest that examination of the Convair revealed definite indication of an explosion. Investigators found shreds of burned paper towels, burned matches and a dynamite blasting cap in the plane's lavatory receptacle.

In addition to CAB, the FBI investigated the case under the anti-sabotage law for airlines, passed at the last session of Congress. Neither the FBI nor the CAB presented evidence at the inquest.

Avensa orders five F-27s for delivery in 1958

Avensa (Aerovias Venezolanas, S. A.) has ordered five Faichild F-27 Friendship turboprop transports and has short-term options for three more. Deliveries will begin in February 1958.

Avensa operates a fleet of 25 aircraft serving Venezuela's most important cities with daily flights. The carrier provides international service between Venezuela and Miami, via Montego Bay, Jamaica.

Military obligations decline to $233 million in May

Military obligations for aircraft, missiles and related equipment during May reached the lowest monthly level for fiscal 1957 with a total of $233 million. The 11-month July-May figure aggregated $8,624 million.

Air Force obligations for aviation hardware totaled $146 million in May, bringing the 11-month total to $6,742 million. Navy obligations were $88 million in May giving it a cumulative total for the 11 months of $1,882 million.

Air Force and Navy spent $823 million for aircraft, missiles and related during May, including $620 million by the Air Force and $202 million by the Navy. For the 11-month period they spent a total of $8,592 million—$6,649 million by Air Force and $1,943 million by the Navy.

CAB examiner recommends National route extension

National Airlines has been recommended by Civil Aeronautics Board Examiner William J. Madden for a new route extension from Jacksonville to St. Louis via Atlanta and Nashville.

Madden's initial decision also recommends: (1) amendment of Eastern Air Lines' Route 10 certificate to permit direct flights between St. Louis and Memphis; (2) amendment of Delta Air Line's Route 24 certificate to extend the route from

Birmingham to Memphis; (3) amendment of Eastern's Route 5 certificate to redesignate Chattanooga as an intermediate and extend the route from Chattanooga to Birmingham.

Madden had also considered Delta for the major award, but chose National because its route system most needed strengthening. He compared National to Northeast Airlines in the New York-Florida Case: "Hemmed in on the north, east and south, and with relatively few growth opportunities to the west."

"If Delta's system is solidified in the direction of St. Louis," Madden added, "National will be further frozen in its present pattern."

Other applications in the case, including those of Braniff Airways, Trans American Airlines and American Airlines, would be denied under Madden's proposal.

Bristol reveals details of Bloodhound missile

Britsol has released first details of its Bloodhound ramjet-driven surface-to-air missile.

The British missile, which has Ferranti SAH (semi-active homing) is launched from fixed bases and its fire-control and lock-on radar tracking are integrated with ground radar. Power is supplied by two Bristol Thor ramjets. Thor engines were flight tested in the Bobbin, a test missile of similar form but much larger than Bloodhound.

Bloodhound has a cylindrical body about 20 in. in diameter with a pointed ogival nose and blunt tail. The ramjets are mounted on short pylons above and below the afterbody.

Tapered stub wings are mounted about the mid-section of the body. Wings have the most taper on the trailing edges and the tips are cut back. A rectangular tail plane is about half the area of the wing.

There is no fin, directional stability being maintained by the considerable side area of the body and the two ramjets.

PAA disputes CAB complaint on commission practices

Pan American World Airways this month disputed a CAB enforcement complaint which accused PAA of paying higher than agreed commission to travel agents.

PAA v.p.-traffic and sales Willis G. Lipscomb termed the complaint "so general that it is impossible for the company to determine the exact nature of the charges." But he expressed confidence that "any investigation of PAA's practices and procedures will find them to be in full accord with industry and international standards."

CAB Compliance Attorney John F. Wright said PAA paid 10% commissions to agents instead of the standard 7%. Lipscomb said PAA "has never knowingly paid anything except the authorized commission."

White House upholds CAB and CAA in controversy with military over control of nation's airspace

The White House has turned down a top-level bid by the military to sidetrack a Civil Aeronautics Board proposal which would place control of the nation's airspace in the hands of civil aviation departments of the Government.

Upheld was CAB's plan to empower the Civil Aeronautics Administrator to designate restricted areas and to revoke or modify existing restrictions as may be necessary "to assure the safety of aircraft in flight."

The long-smoldering feud between civil and military agencies broke out into the open on July 30, when CAB proposed a new regulation in a public assertion of power given to it by Congress in 1938. On August 1, CAB Members were summoned to the White House as the military apparently had taken its cause to the Office of the President. Presidential Assistant Sherman Adams presided and declined to interfere with the Board's move.

Military has had a form of indirect control over the airspace which it will relinquish if the CAB proposal stands up. Designation of restricted airspace has been a matter subject to the unanimous vote of members of the Air Coordinating Committee's Airspace Use Panel. Since the military is represented on that body, nothing objectionable to the military could pass because of the need for a unanimous vote.

CAB Chairman James R. Durfee, terming the ACC machinery outmoded, said "past compromises resulting from the need to obtain unanimous agreement before action could be taken have not always been in the public interest."

CAB's statutory power in the airspace fight extends to both civil and military use of the air. Its plan is to designate the CAA Administrator as the top single voice on use of airspace in the U.S. and its possessions. Actions of the Administrator could be subject to review by the Board.

The military could over-ride or ignore such civil control only when conducting operations required "as a result of intelligence of actual or impending cases inimical to the United States."

Despite their White House victory early this month, however, CAB and CAA have not yet won the battle. Board's regulation has been advanced for comment by all interested parties who have until Sept. 3 to submit their views. Final promulgation of the new rule is slated subsequent to that date.

CAB denies Pan American bid to parallel Northwest on transpacific Great Circle route to Tokyo

Civil Aeronautics Board early this month solidified transpacific routes of Pan American World Airways and Northwest Airlines but denied PAA's bid to parallel Northwest on the Great Circle route between Seattle/Portland and Tokyo. Board's decision was approved by President Eisenhower.

Specifically, the Board (1) changed from temporary to permanent Northwest's certificate between Seattle/Portland, Anchorage and Tokyo, (2) granted Pan Am a permanent Great Circle route between Los Angeles/San Francisco and Tokyo, and (3) denied PAA's bid to parallel NWA's northern Great Circle route.

CAB Chairman James R. Durfee, Vice Chairman Chan Gurney, and Members Harmar D. Denny and G. Joseph Minetti voted unanimously in the case in which new Member Louis J. Hector did not participate.

Board was thus reaffirming a decision reached by it in late 1954 in which it refused to grant PAA rights similar to those held by Northwest. President Eisenhower, at that time, deferred action on the agency's decision and subsequently ordered further hearings which led to this month's verdict.

Possibility that the issue will again be reviewed in the near future was seen in a request by the President for annual review of U.S.-Tokyo traffic.

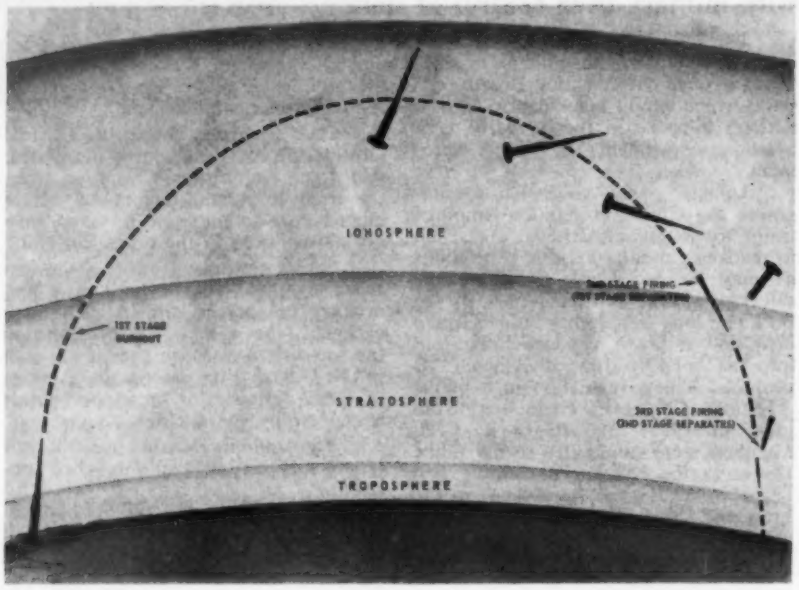
CAB expressed the opinion that PAA's current Pacific route is one of the strongest U.S. international routes in the world and that grant of an additional northern Great Circle route would give PAA "further dominance." Agency said its action, while granting first-time permanent rights in Tokyo to PAA and Northwest, will also preserve necessary "competitive balance" between the two lines.

While PAA's new Great Circle route between California and Tokyo is permanent, its existing "mid-Pacific" route between California, Hawaii, Wake, Guam and Tokyo expires in 1960. So do Pacific authorizations of Northwest other than that for U.S.-Tokyo service. Thus, a full-scale review of the Pacific is planned by the Board when those certificates come up for renewal.

President Eisenhower's views, as contained in an August 2 letter to CAB Chairman Durfee, could lead to an earlier review, however. Wrote the President: "It is this Administration's objective, wherever traffic justifies it, to provide competitive U.S. service on all international and overseas routes from all gateways.

"I request the Board to review periodically U.S.-Tokyo traffic with a view to achieving this objective on that segment of our international air routes as soon as possible, and to report to me at least once a year on the results of such reviews."

X-17 accelerates downward to test nose cones



LOCKHEED'S X-17 research test missile reaches maximum velocity after firing third-stage rocket while heading downward toward earth following flight into ionosphere. First stage of vehicle is large solid-propellant rocket, second stage is cluster of three Thiokol Recruit rockets and third stage is single Recruit. Numerous ballistic missile nose cones have been successfully tested on X-17.

Air Force activates first strategic missile wing

Air Force has announced activation of its first strategic missile wing at Cooke Air Force Base, Lompoc, Calif., and Army will activate its first Redstone ballistic missile group September 9 at Huntsville, Ala.

The AF unit is designated 704th Strategic Missile Wing and will be equipped with Northrop Snark intercontinental missiles. Col. William S. Rader, presently Inspector General of the USAF Air Research & Development Command, will command the wing. First operational Snark combat wing is scheduled for late 1958.

The Army Redstone unit will be designated 40th Field Artillery Missile Group and consist of the 217th Field Artillery Battalion, the 63rd Ordnance Company and the 580th Engineer Company. Total strength will be about 600 men.

Top four aircraft firms did 55% of work in '54

More than half of the $5,545,967,000 worth of aircraft manufacturing work done in 1954 was accomplished by four firms, according to a recent Congressional study of the industrial concentration in the U.S. The top four did 55% of the business that year.

The report disclosed that in 1954 the 100 largest manufacturing companies accounted for 30%, in dollar value, of all U.S. production. In 1947, the same companies did 21% of the total dollar value production.

In the aircraft industry, the eight largest companies did 79% of the business. Total dollar worth of the work, including engines and propellers, was about $8.7 billion. Another $2.8 billion went for aircraft equipment not elsewhere classified.

Of the aircraft engine and parts business, totaling $3,190,539,000, the four largest firms got 63% of the business. Top eight did 81% and top 20 accounted for 91%.

GeissGears gets order for crosswind gears

GeissGears, Inc., has received an order for crosswind landing gears for Cessna OE-1 and OE-2 Marine liaison aircraft. This is the first order placed by the military for crosswind gears as a separate item.

Previous military use of the crosswind gears has been on the B-52 and Cessna 195. Beech Aircraft Corp. is equipping about 60% of its E18s with the Geisse Safety Gear as optional equipment.

More 4-engine aircraft now flying, CAA reports

Four-engine transports exceeded twin-engine transports in numbers used in scheduled airline service for the first time last year, according to the Civil Aeronautics Administration "Statistical Study of U.S. Civil Aircraft as of January 1, 1957." Copies are available at the Department of Commerce at 50¢ each.

Number of U.S. aircraft in scheduled use increased 16% during 1957—from 1,497 to 1,735 planes. Of these 848 were twin-engine craft and 861 were four-engine. DC-3s, which haven't been built since 1945, continue to be the most numerous craft, representing more than 20% of the total U.S. fleet.

Vertol to study use of ducted fans in wings

Vertol Aircraft Corp. has received a $66,547 contract to explore the use of ducted fans in aircraft wings. The research program is being funded by the Army and is being carried out in cooperation with the Office of Naval Research.

Vertol's primary area of investigation will be the aerodynamic effects of the transition from hover to forward flight. Company will also study how airflows from fans and various wing shapes interact, possibility of using ducted fans for forward propulsion as well as vertical lift, and their use in control surfaces.

PAA crew cited for avoiding disaster in Pacific

CAB has credited the crew of the Pan American World Airways Boeing Stratocruiser with averting a possible major disaster when the plane was ditched in the Pacific October 16, 1956.

CAB found the probable cause of the accident to be an "initial mechanical failure which precluded feathering the No. 1 propeller and a subsequent mechanical failure which resulted in a complete loss of power from the No. 4 engine."

All 31 occupants of the aircraft were evacuated safely after the ditching. Commended by the Board were Captain Richard N. Ogg, First Officer George L. Haaker, Navigator Richard L. Brown, Flight Engineer Frank Garcia, Jr., Purser Patricia Reynolds and Hostesses Mary Ellen Daniel and Katherine S. Araki.

Report Australia favors Northrop T-38 over F-104

Australia has reportedly selected a fighter version of the Northrop T-38 supersonic jet trainer for manufacture by the Commonwealth Aircraft Corp. instead of the Lockheed F-104. The F-104 is considered "too specialized for the many needs of the RAAF," according to Defense Minister Sir Phillip McBride.

The Australians will negotiate with the U.S. for 12 Lockheed C-130s and plan to build more Avon-powered F-86s as a stop-gap measure while preparations move ahead for the fighter version of the T-38.

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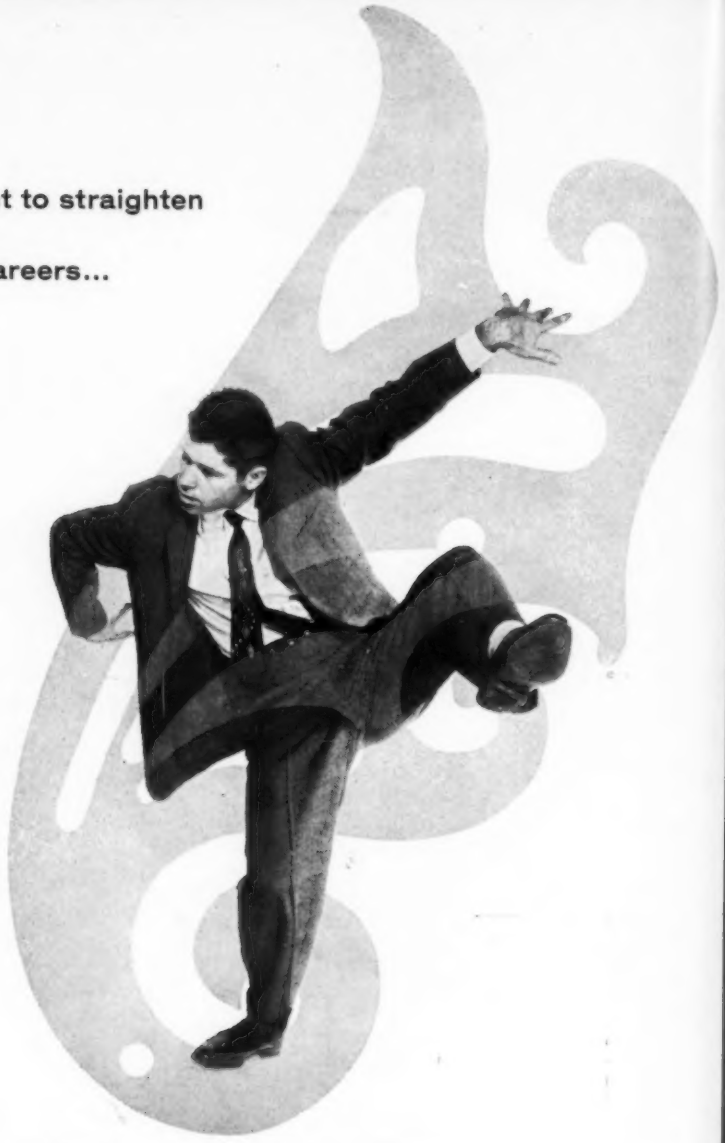

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WEST COAST TALK

by Fred S. Hunter

Boeing looking for 'right' powerplant for Model 727, short/medium-range jet

KEEP YOUR EYE on Boeing. They have vision and courage up there in the Pacific Northwest. (Must be the climate.) Next undertaking may be a prototype of the Model 727 short- and medium-range turbojet transport. Right now, Boeing's search is for the right powerplant. Possible engine combinations include two P&W J57s, four P&W J52s, four British Avons, for an aircraft that would be in the category of 100,000 to 135,000 pounds and have outstanding short-field performance.

Boeing's $16-million venture in the 707 jet tanker/transport prototype is paying off handsomely. If the Boeing management decides there's an even chance again to get the jump on its competitors by building a prototype, this time the Model 727, you can take a ticket they'll move fast.

So far, apparently, Pratt & Whitney has had no airline takers on its recent offer of a titanium J75 engine. The advantage would be a weight-saving of 300 pounds. At 1,200 pounds per aircraft (four engines) this would be a tempting saving (the equivalent of six tickets) to purchasers of those models of the Boeing 707 or Douglas DC-8, using the larger engines. But also involved is an increase of $30,000-$35,000 in the cost of the engine.

Price tag on a steel J75 is $225,000. Add $30,000 (or more) per engine and you go up to $255,000 or more than $1 million per aircraft, for the titanium engines. Cost-conscious airlines are looking for lower, not higher, prices. P&W's proposal, incidentally, applies only to the J75 engine. No similar offer has been made on the $155,000 J57 engine.

Douglas has picked the Sperry SP-30 autopilot for the DC-8 jet airliner, as has Convair for the 880, but Boeing's selection for the 707 is the Bendix PB-20. The Boeing KC-135 tanker uses Lear's L-10 . . . American Airlines, so we hear, may order more Boeing 707s and, if so, may decide to go to J75-powered Models 320s for use on the longer runs. AA also is considering a cargo version of the Lockheed Electra as well as the turboprop Douglas DC-7D for its air freight development program . . . Curtiss-Wright's TJ38 turbojet will turn up full power on a 100-degree day, which is another reason the engine manufacturer thinks it has a chance to be considered by any new Boeing 717 or Convair 880 buyers despite its late entry into the market.

Marquardt Aircraft employes could hardly believe their eyes the other morning when they reported for work and found pickets patrolling the main gate. There are no unions at Marquardt. Turned out that a contractor engaged in construction work at the plant was having trouble with a building trades union.

Among carriers showing interest in Boeing's Model 717-020 is Western. This is the lightweight version of the Boeing 707-120, known in Seattle as the "bargain basement special," because its selling price of $3.7 million is more than half a million under that of a 120. The 717 is just about the right size for WAL's regional (regional, with Mexico City?) route structure.

Douglas recently bought some long lead-time DC-6B parts on speculation and had the wisdom of the purchases confirmed in short order. It has already sold the aircraft. Douglas has made half a dozen unannounced sales in the last couple of weeks. The way orders and re-orders keep coming in from airlines continuing to face a demand for more seats makes one wonder just when the DC-6/7 production line at Santa Monica actually will phase out. Douglas is now up to October, 1958, in quoting deliveries. It won't take much more to extend the line into 1959.

One thing to remember is that the DC-6/7 tooling at Santa Monica is pretty flexible. Production, now at a high of 15/16 airplanes a month, can be cut to a mere trickle and still show a profit. So—don't be too surprised if Douglas is still turning out a DC-6A (or B) now and then at Santa Monica even after DC-8s are coming out the door at Long Beach.

Army helicopters helped save an estimated 75% of a $5-million cherry crop when unseasonal rains at ripening time endangered the fruit in 3,800 acres of Stockton orchards. Wet fruit, when exposed to the sun, splits and spoils. Copters hovering over the orchards blow the moisture from the trees and dry the fruit . . . Maj. Joseph E. Barrett, the president's helicopter pilot, went through Los Angeles Airways' advanced flight training program when he was a lieutenant.

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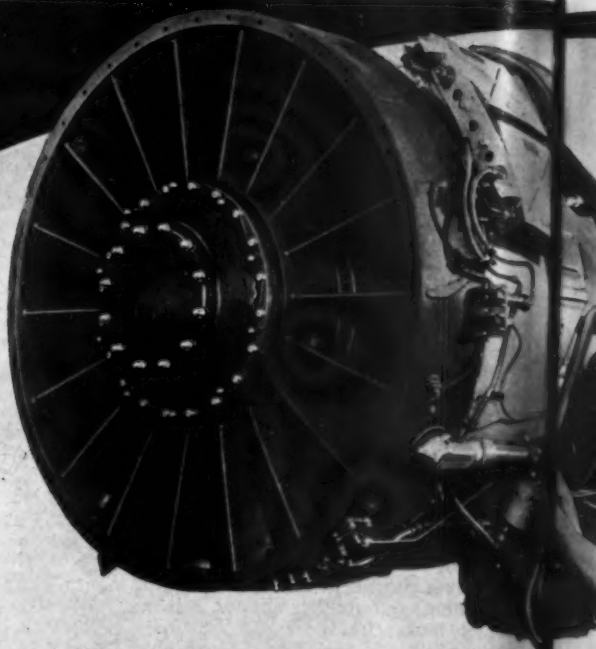

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The J-75's basic configuration stems from the J-57's axial-flow design, which features simple, permanently fixed stator vane construction. Despite its 50 per cent increase in thrust, the J-75 is only slightly larger than the J-57, with a lower specific weight and outstandingly low specific fuel consumption.

Already announced as the power plant for the Republic F-105 fighter for the Air Force and for production models of the Navy's Martin P6M seaplane, the J-75 will also power other Air Force and Navy high performance aircraft still on the classified list. Its commercial version, the JT4, will power a majority of the Boeing 707 and Douglas DC-8 jet airliners ordered by the world's leading airlines, while others will be powered by the JT3, commercial version of the J-57.

Quantity production of the J-75 again demonstrates that—whatever form the future takes—Pratt & Whitney Aircraft is prepared to offer continued advancement in power plant design and production.

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• Meets MIL-E-5272 • −65°C to +125°C temperature range.

Oster

	SIZE 8	SIZE 10	SIZE 11	SIZE 15	SIZE 18
Oster Type	8-5001-00	10-5052-00	11-5101-00	15-5153-00	18-5201-00
Electrical Characteristics:					
Frequency (cps)	400	400	400	400	400
Torque at Stall (oz.-in.)	.15	.30	.63	1.45	2.35
No Load Speed (rpm)	6500	6500	6500	5200	5200
Speed at Half Torque (rpm)	4000	4000	4000	3200	3200
Time Constant (sec.)	0.03	0.015	0.016	0.017	0.013
Reversing Time (sec.)	0.051	0.025	0.028	0.030	0.022
Theo. Acceleration at Stall (rad/sec²)	22500	45000	41500	31000	40000
Operating Temp. Range (°C.)	−54 to +125	−54 to +125	−54 to +125	−54 to +125	−54 to +125
Slot Effect	1.6v/26v	1.0v/36v	1.0v/40v	1.0v/40v	1.0v/40v
Duty Cycle	Cont.	Cont.	Cont.	Cont.	Cont.
Fixed Phase					
Voltage	26	115	115	115	115
R (Stall) Ohms	196	1270	1250	490	280
X (Stall) Ohms	183	1560	1780	890	570
Z (Stall) Ohms	268	2210	2175	1030	640
P.F. (Stall)	0.73	0.57	0.58	0.49	0.45
Effective R (Stall) Ohms	366	3840	3800	2160	1460
Parallel Tuning cond. for unity P.F. (Stall) Mfd	1.0	0.13	0.15	0.33	0.55
Control Phase					
Voltage	40/20	40/20	40/20	40/20	40/20
*R (Stall) Ohms	480	124	145	58	39
*X (Stall) Ohms	445	215	204	103	77
*Z (Stall) Ohms	660	248	250	118	86
*P.F. (Stall)	0.73	0.50	0.58	0.49	0.45
*Effective R (Stall) Ohms	910	495	430	240	190
*Parallel Tuning cond. for unity P.F. (Stall) Mfd	0.4	1.4	1.3	2.9	4.1
Mechanical Characteristics:					
Rotor Inertia (gm. cm²)	.47	.47	1.07	3.3	4.0
Weight (oz.)	1.2	2	4.5	8	14
Mounting Type	Synchro	Synchro	Synchro	Synchro	Synchro
Motor Length	.863	.672	1.703	1.625	2.03
Type Shaft	Pinion	Pinion	Plain	Plain	Plain
Shaft Extension	.375	.218	.437	.540	.540
Outside Diameter	.750	.937	1.062	1.437	1.750
Type Connection	Leads	Terminals	Terminals	Terminals	Terminals

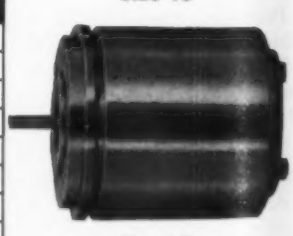
*For 40v connection

Size 8

Size 10

Size 11

Size 15



Size 18

This complete line can be varied by Oster specialists to your precise requirement. Write today for further information, enclosing detailed data on your needs.

Other products include motor-gear-trains, synchros, AC drive motors, DC motors, servo mechanism assemblies, motor tachs, servo torque units, reference and tachometer generators, actuators, motor driven blower and fan assemblies and fast response resolvers.

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Avionic Division
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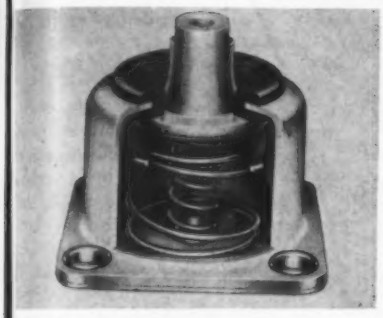
Engineers For Advanced Projects:
Interesting, varied work on designing transistor circuits and servo mechanisms. Contact Mr. Zelazo, Director of Research, in confidence.

BURTON BROWNE ADVERTISING

Circle No. 29 on Reader Service Card.

NEW PRODUCTS



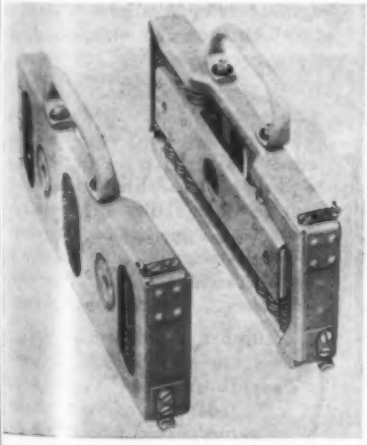
Vibration isolators

BARRY CONTROLS INC. has developed a line of lowcost vibration isolators for airborne equipment.

"Lo" Mount is designed for compliance with MIL-C-172B. It has low transmissibility at resonance and a low natural frequency provided by a spring and friction-damping feature. At inclinations of 10° the mount performs effectively.

Mount is available in 7 load ranges from .25 to 10 lbs. Long-core and short-core units are available in each load range. Each unit weighs about 1½ oz.

Circle No. 120 on Reader Service Card.



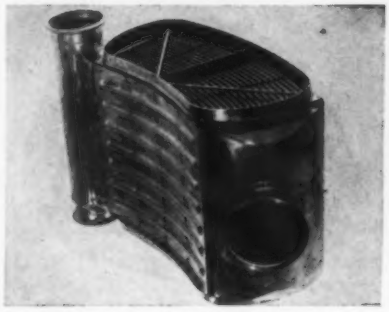
CG mounting system

ROBINSON AVIATION, INC. has developed an all-metal, lightweight, center-of-gravity mounting system for a 150-lb. radar system.

Model 1660 effectively attenuates vibrationary modes and eliminates dangerous shock transmission by incorporating Met-L-Flex resilient elements. Natural frequency in the longitudinal and vertical planes is 20 cps, in the lateral plane 15 cps.

Amount of vibration isolation at 50 cps is 80% and improves at higher frequencies.

Circle No. 121 on Reader Service Card.



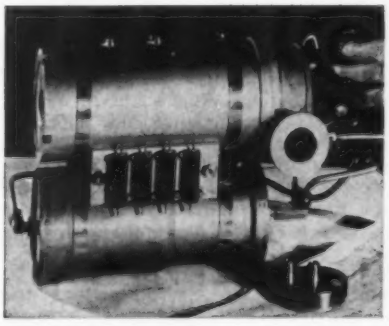
Heat exchanger

A stainless steel welded and brazed heat exchanger, developed for commercial aircraft use by The Garrett Corp.'s AIRESEARCH MFG. DIV., will be produced for the Douglas DC-8 jet airliner.

Of extremely light weight, the heat exchanger will be used in a primary cooling stage for air bled from the jet engines' compressors at pressures up to 90 psig and temperatures up to approximately 800°F. This cooled air will be used in service functions.

Cooling action is obtained by ducting cold outside air around the tubes of the heat exchanger. Although 18″ long, 12″ wide and 7″ deep, the unit weighs only 20 lbs. Brazing the all-tubular unit provides it with a high degree of strength and clean union of parts. An AiResearch air temperature control system also will be used on the DC-8.

Circle No. 122 on Reader Service Card.

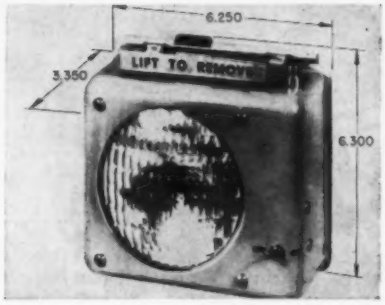


Auxiliary power unit

GENERAL ELECTRIC CO. is producing a fully self-contained electric and hydraulic auxiliary power unit for missiles.

The turbine-drive unit consists of several modular components and can supply electric power, hydraulic power, or both with power ratings from 1.5 to 10 hp. Acceleration to rated speed and output is within half a second.

Circle No. 123 on Reader Service Card.



Emergency escape light

MICRO SWITCH is marketing an emergency escape light for aircraft that operates automatically and independently of the plane's main lighting system.

Light is an impact-operated, battery-powered lantern designed to fulfill CAA requirements governing emergency lighting that became effective May 31.

A severe jolt in any horizontal direction turns the lamp on. It is powered by four flashlight cells and has a sealed-beam lamp.

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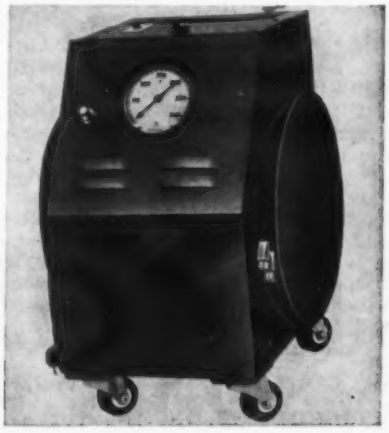


Hydraulic power units

HI-SHEAR RIVET TOOL CO. is producing air-hydraulic and electric-hydraulic (shown) power units designed for varied uses.

Each unit features a demand system with constant pressures to 3,000 psi.

Units have been used to provide power for checking aircraft and missile hydraulic instrumentation systems, to lubricate bearings and to drive blind bolts and rivets.

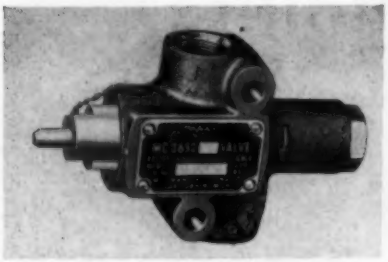
Principal features of the new power units, according to the manufacturer, are simplicity of operation and ease of maintenance.

Circle No. 125 on Reader Service Card.

Relief valve

M. C. MANUFACTURING CO. is marketing the MC 2652 relief and controllable valve, featuring small size, light weight and low leakage.

Valve is intended primarily for



use in pneumatic sequencing system. It is of the poppet type, has a relief valve in the reverse flow direction. Operating pressure is 1,000 psi, ambient temperature range —65°F to 250°F. Burst pressure is 3,750 psi. Weight .20 lbs., connects with ¼″ tubing.

Circle No. 129 on Reader Service Card.

Fastener seal

A controlled-flow fastener seal designed to meet aircraft needs is being marketed by PARKER-KALON.

Known as Nylite Staps, the seal consists of a self-conforming nylon washer pre-assembled to a standard P-K self-tapping screw. Constructed of DuPont Zytel, the nylon washer acts as a shock-absorbent buffer.

Circle No. 126 on Reader Service Card.

Fire safety switch

AVIONIC PRODUCTS ENGINEERING CORP. has developed a dual fire emergency safety switch which is a fire emergency control and fire indicator for twin-engine aircraft.

Designated Model E-875, the device contains an interconnect feature which restricts the operations of a second control after the first is pulled. It is impossible to have both controls operated at the same time. If both handles are pulled simultaneously, both will be locked and non-operable.

Circle No. 127 on Reader Service Card.

Woven electric heaters

CHROMALOX, INC. is producing laminated woven electric heaters that are said to be thin enough to fit into cramped instrument spaces, flexible enough to be bent around sharp corners and available in practically any shape.

Heaters may be insulated with silicone-rubber, Neoprene, natural rubber or synthetic rubber. Maximum heater surface temperatures are 150°F to 350°F, depending on insulation.

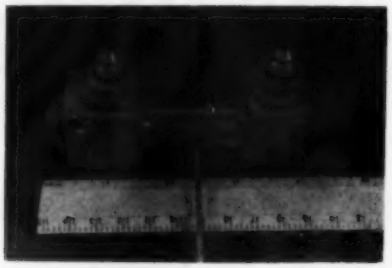
Widths can range from 3/8″ to 24″ and maximum length is 24″. Thickness is determined by wire size and insulation, minimum is .020″.

Wattages range from 15 per sq. in., voltages 6, 12, 24, 48 and up to 230. Special applications may use 440 v.

Circle No. 128 on Reader Service Card.

Cable cutter

STANLEY AVIATION CORP. has developed a ballistically-operated cable cutter with self-contained cartridges. Triggered by low incoming gas pressure, unit contains two indepen-



dently fired cartridges, either of which produces sufficient force to sever a 1/8″ steel cable.

Weighing .45 lbs., unit measures 4″x1″x2¼″. Applicable to operations requiring instantaneous cutting of cables, wires, tubes or rods.

Circle No. 133 on Reader Service Card.

Packaged blowers

McLEAN ENGINEERING LABORATORIES has introduced a new range of packaged blowers designed to protrude into the normally unused base section of an electronic rack.

Models 2P408 and 2Q408 require 5¼″ of panel height, but have the performance of the McLean Model 2E408 blower which is 7″ high throughout, and will dissipate a 1.5 kw heat load with an air temp. rise of 10°C.

Circle No. 130 on Reader Service Card.

Refueling system

THIEBLOT AIRCRAFT CO. has announced that it is developing a mid-air "flying pipe" refueling system which will permit one fighter to refuel another at altitudes above 30,000 ft. and speeds of 500 mph.

System consists of a pipe arrangement that is dropped from the refueling pod and takes the shape of an inverted "T" in the airstream. Thieblot says the new pipe system is more stable than other refuelers and provides a steadier target to the pilot of the fighter being refueled.

Circle No. 131 on Reader Service Card.

Temperature indicator

FORD INSTRUMENT CO. is manufacturing a 16-oz. transistorized engine exhaust temperature indicator for use with aircraft gas turbines.

Featuring instantaneous warm-up and a 2-sec. full-scale response, the unit continuously displays temperature over a 200-1,000°C range with ±5°C accuracy. Operation of the unit is based on servoing the dc voltage from a chromel-alumel thermocouple, using the servo output to drive coarse and vernier pointers. Power required is 108-121v 400 cps ±5%; 24-29v dc.

Circle No. 132 on Reader Service Card.

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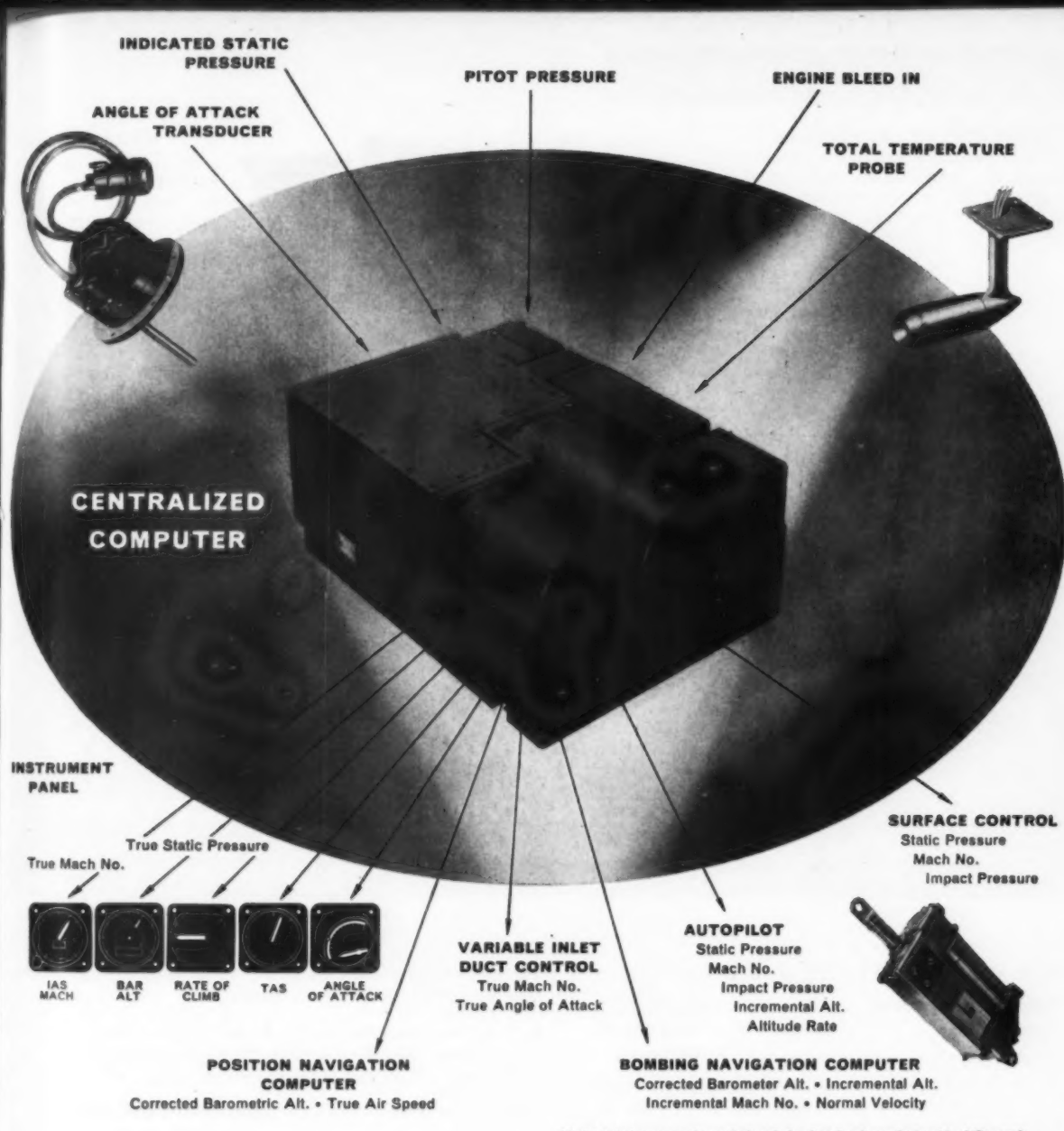

All illustrated components are designed, developed and manufactured by AiResearch

Centralized Air Data System

This AiResearch computer system eliminates duplication of components, cutting down space and weight requirements over decentralized systems by many times. It can cover a wide area of functions while meeting the most rigid specifications in regard to accuracy and dependability. Since the great majority of its components are AiResearch products, both compatibility and reliability are assured.

We are prepared to assume overall responsibility for systems or sub-systems.

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Circle No. 30 on Reader Service Card.

July, 1957
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Tips are smaller

Two directors of a trunk airline were playing gin rummy in the lounge of a DC-6B. They agreed that the stewardesses should have the winnings. At game's end, one director owed the other $5.50 and called one of the stewardesses to pick up the dough. And she did, too. "Our supervisor says that anything over $5 is a gift, not a tip," she quipped.

Some amusing intelligence

Story circulating on the West Coast is that the "1917 Nieuport," which was flown from Baltimore to Andrews AFB to observe anniversary of Bleriot's channel trip in connection with Air Force Assn. convention, ain't a Nieuport, but is actually a Garland-Lincoln LF-1, a plane built by Garland Lincoln, an ex-Paul Mantz movie stunt pilot.

This plane was flown from Van Nuys, Calif. to Washington in company with another plane alleged to have been a replica of 1917 German Fokker, the publicity saying these were replicas of 1917 vintage airplanes that opposed each other during World War I. Dope is the Fokker was a Wichita plane, built by Walter Beech.

Linguist Drinkwater

T. C. Drinkwater, president of Western Airlines, surprised his friends and made a ten-strike hit with the Mexicans when he gave short speeches at dinners inaugurating WAL service to Mexico in both Los Angeles and Mexico City in mid-July.

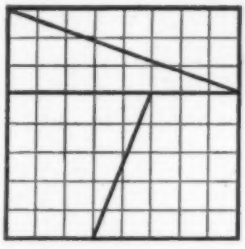
He had never set foot in Latin America but he worked hard on pronunciation and, although his performance was something less than perfect, he made a big hit with the Mexicans for the try.

In Los Angeles a Mexican translator brought down the house by translating Drinkwater's Spanish speech into English.

Cause for concern

"It is a matter of deep concern to us that the sudden termination of the Navaho program by the Air Force requires disruption of the team that, in our opinion, was making the greatest contribution to the nation's defense in the entire missile field." These were the words of J. H. Kindelberger and J. L. Atwood, chairman and president respectively of North American Aviation, in a joint message to employes affected by the termination. In the same statement, Kindelberger and Atwood said the amount that had been spent on North American's portion of the program and related research work was more than $500 million.

Can you solve this one?



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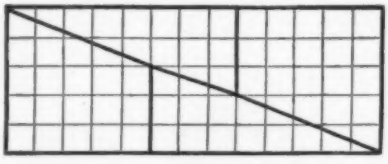


2

Figure 1 contains 64 squares. When cut as shown and reassembled into Figure 2, there are 65 squares. Why? (*Contributed by Litton Industries, Beverly Hills, Calif*)

AMERICAN AVIATION welcomes solutions from its readers and from time to time will publish other problems as they are sent in.

Know your regulations?

DID YOU KNOW THAT when operating a transport category airplane, under CAR 42, you cannot operate downwind when landing, even though a non-transport category airplane is allowed to do so?

The definition of "flight time" appears in nine different places in the Regulations and that out of these nine instances there are two different interpretations—one which says it is block-to-block and another indicating that flight time begins when the aircraft leaves the warm-up apron and ends when the pilot returns to the parking apron and turns the switches off.

Under the presently existing CARs, your six-year-old son, if he were capable, could apply for and pass the airline transport pilot rating examinations but he would then be required to wait 17 years or until he reached the age of 23 before he could have a license issued to him.

New airborne fire fighter

The U.S. Forest Service is now flying its own converted TBM tanker aircraft in the Southern California area for the control of spot brush fires in inaccessible areas.

The tankers, carrying approximately 450 gallons of water and borate, were put to their first use recently during a brush fire caused by the crash of a military jet.

A spokesman for the Forest Service said the planes will be maintained in an alert status during all daylight hours, but the agency will continue to depend upon chartered aircraft for the bulk of their major fire-fighting operations.

Non-technical hazard

Two Air Force psychologists have concluded that nuclear radiation poses no "psychological" hazard for persons working with radioactive materials. They noted a tendency on the part of janitors, guards and other non-technical personnel of nuclear laboratories to blame routine illnesses on radiation, but said this is only a minor problem. Their study disclosed that one company, after a chemical explosion of radioactive material, received a dozen telephone calls from people who thought that some employes might have quit and who hoped to get a job.

What's in a name?

One wonders how many passengers British European Airways loses by disguising the identity of its DC-3s under the name Pionair. Almost every member of the traveling public knows the DC-3 but few people outside of the United Kingdom have ever heard of the Pionair.

Industry talk . . .

Contract experts say it will take more than a year to clean up the paper work on the termination of the Navaho. Responsibility for this job falls on the Sacramento Air Materiel Area, which has contract cognizance over North American.

• • •

Top nonsked at Lockheed Air Terminal since Trans American Airlines quit is the one-time Skycoach combination of Great Lakes Airlines and Currey Air Transport, now operating under the banner of Transcontinental Air Lines Agency. They're running common carrier to Chicago and New York with DC-4 equipment and also to Honolulu. Latter is a new venture, started this summer, and it introduced the $99 fare to the Hawaii market. Previously, Transocean had the low fare, $109. Coach fare on United or Pan American is $125.

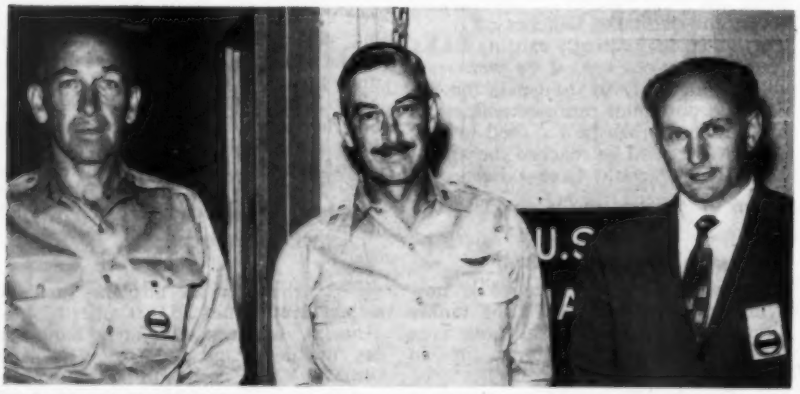
• • •

If there is an airplane incident or accident within 25,000 miles of Los Angeles, you can absolutely bank on its making Page One of The *Los Angeles Times*. Seems to be the paper's policy to play up big every kind of air accident or near-miss with result that there are few front pages of this newspaper without an airplane item emblazoned in headlines.

PEOPLE

Co-directors of UAT (Union Aeromaritime transport), large French airline, are Roger Loubry (top) and Jean Combard (bottom). Photos were taken by Wayne W. Parrish, president and publisher of AMERICAN AVIATION Publications, at luncheon given for him in new dining room of UAT at the airline's expanded quarters at Le-Bourget Airport, Paris.

Bendix Trophy winner, Capt. Kenneth D. Chandler (center), receives congratulations from Gen. Curtis E. LeMay (left), USAF vice chief of staff, and Malcolm P. Ferguson, president of Bendix Aviation Corp. Chandler flew a Convair F-102A from Chicago to Washington, D. C., in record time of 54 min., 45.5 sec. in race that opened the Golden Anniversary Air Show of the Air Force Assn. Trophy is shown at right.



Maj. Gen. J. B. Medaris (center), commanding officer of the Army Ballistic Missile Agency, with two other missile experts at a recent meeting at the Huntsville, Ala., installation. Left is Maj. Gen. Louis T. Heath, commanding officer of the Army Field Command and right is Donald Patterson, director of guided missiles, Office of the Assistant Secretary of Defense for Research & Development and Engineering.

Father pins wings on daughter. Capt. A. R. Edwards, veteran Trans-Canada Airlines pilot, pins stewardess wings on his 21-year-old daughter, Janey. It is TCA's first father-daughter aircrew team.

LEWIS

LIGHTFOOT

BROWN

GOULD

BECK

BETLEY

MANUFACTURING

Name	New Position	Former Position
David S. Lewis, Jr.	VP McDonnell Aircraft Corp.	Projects manager
Ralph B. Lightfoot	Chief engnr. Sikorsky Aircraft	Chief of flight research
Brig. Gen. C. Pratt Brown (USAF ret.)	Asst. to president, Republic Aviation Corp.	Deputy Asst. Chief of Staff, USAF
Dr. Martin J. Gould	Dir. research, National Electronics Labs	Research specialist, Missile Test Center, Patrick AFB, Fla.
Robert Beck	Chief engr., Packard-Bell Computer Corp.	Bendix Computer Div.
Matthew J. Betley	President, Titeflex, Inc.	VP-gen. mgr. Aeroquip Corp.
Dr. John L. McLucas	President, Haller, Raymond & Brown, Inc.	VP-tech. dir. Topp Industries
John P. W. Vest	Chief engr. operations, Sikorsky Aircraft	Exec. asst. to chief engnr.
John W. Laister	VP-operations, Aero Design & Engineering Co.	VP-mfg., Pacific Airmotive
I. J. Hammill	Exec. vp-mgng. dir., Walter Kidde & Co. of Canada, Ltd.	Mgr. Aviation Div., Walter Kidde & Co. Inc.
Donald P. Germeraad	Chief pilot, Convair 880 test program	Chief engnrg. test pilot
Leonard Brewer	Proj. dir., rocket engines, Explosives Div., Olin Mathieson Chemical Corp.	Thiokol Chemical Corp.
Willard D. Walker	Chief electronics engr., Convair-Astronautics	Asst. chief engr., Kin Tel
Richard Driskell	Engng. prod. mgr., Humphrey, Inc.	Supvr. Convair-San Diego electronic model shop
Sterling C. Spielman	Dir. of engrg., Philco's Government & Industrial Div.	Dir. electronic engrg.
Stanley N. Read	Dir. mfg., Iron Fireman's Electronics Div.	San Francisco mfg. business consultant
Larry Kemp	Adv. mgr., Iron Fireman's Electronics Div.	Adv. mgr., F. B. Connelly Co.
Gordon P. Pelts	Retired	President, chief engr., Microdot, Inc.
Clayton Triggs	President, Microdot, Inc.	Manag. dir., USO-Southwest activities
Jerry Parks	Chief engr., Microdot, Inc.	Cal Tech jet propulsion lab
Edward H. Rehnborg	Chief, transducer products, BJ Electronics	Chief engr., Edcliff Instruments
Harry McPherson	Head, Temco missile weapon system test program	Test coordinator, Convair-Ft. Worth
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Marvin H. Ruffin	VP Chicago Aerial Industries, Inc.	Exec. vp Summers Gyroscope Co.
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Anthony G. Bari	Mgr., Van Dusen Aircraft Supplies, Miami Div.	Mgr. Air Associates, Miami branch
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FACILITIES

L. L. Constantin & Co. has acquired a one-story 20,000-sq.-ft. building at Saddle Brook, N. J. for design and production facilities. Company makes glass-to-metal seals and miniaturized components for electronic equipment and instruments.

Southwest Airmotive has leased the aircraft terminal building at Love Field, Dallas, effective within 30 days after terminal ceases to be used for passengers. The 25,925 sq. ft. will be used for general headquarters, offices and warehouses.

Minnesota Mining & Manufacturing Co. has opened the world's largest magnetic tape plant at Hutchinson, Minn. Facility has 78,000 sq. ft.

Bell Aircraft Corp. has acquired 350 acres near Pembroke, N.Y. as a site for its new Lawrence D. Bell Research Center. Bell also has completed negotiations for a central warehousing building on property purchased last year adjacent to the Wheatfield plant.

Sperry Rand Corp. has leased 11,000 sq. ft. of temporary space at Clearwater, Fla., to begin operations of its new Electronics Division there. An employment office will be established in the space.

Rohr Aircraft Corp. has opened a new $500,000 assembly plant at Auburn, Wash., to produce KC-135 and 707 power packages.

The Carlson Co. has moved to a new building at 3457 Weidner Ave., Oceanside, N.Y.

Electronic Engineering Co. has opened a 40,000-sq.-ft. building at Santa Ana, Calif.

Kaiser Aircraft & Electronics Corp. is planning to build a plant at Phoenix, Ariz., for the manufacture of electronics systems and equipment. The one-story building will employ 40 to 50 technicians and engineers.

Consolidated Electrodynamics Corp. has changed the name of its Electronic Industries Division to Alectra Division.

Cohu Electronic's Kin Tel Division has completed a $250,000 expansion at San Diego. New facilities include an office and engineering building.

Ground has been broken for **Callery Chemical Co.'s** $4-million boron specialty plant at Lawrence, Kan. Production at the facility is slated to begin early next year.

Rocketdyne Division of **North American Aviation** will begin construction of additional office and manufacturing space at Canoga Park, Calif., about August 1. Construction will enlarge facility by 175,000 sq. ft.

Fairchild Engine & Airplane Corp. has announced plans to expand facilities at three of its divisions. Three new buildings will go up at the Aircraft Division at Hagerstown, Md. for work on the Goose missile project and the F-27 and B-52 programs. Ground has been broken at the Engine Division at Deer Park for an engineering office building. Stratos Division at Bay Shore, N.Y. will get production and laboratory space. Total area is 175,000 sq. ft. for the divisions.

Raybestos-Manhattan, Inc. has purchased the plant and equipment of The Graef Engineering Co., Paramount, Calif. The plant becomes the Pacific Division of R/M.

Cal.-Ohm Laboratories, Inc. is making expansion plans for its plant at Sterling, Kan.

Bomac Laboratories, Inc., Beverly, Mass., is building a $1-million plant to double the company's engineering facilities. Completion is slated for later this summer.

Curtiss-Wright Corp. has let a $634,000 contract for installation of a jet engine test facility control system at Wood-Ridge, N.J.

Vertol Aircraft Corp. has formed a subcontracts department as part of the firm's long-range corporate planning program. Bruce McKay, former executive engineer, is manager of the new department.

Doman Helicopters, Inc. has acquired West Fabrication Laboratories, Annadale, N.J. Facility will operate as division of Doman.

Flexonics Corp. will build a 25,000-sq.-ft. plant to house special production for aircraft, rocket and missile industries at Santa Ana, Calif.

Lockheed Missile Systems Division is building a fourth 51,000-sq.-ft. laboratory at its Palo Alto research and development center.

North American Aviation, Inc., has occupied its new $3-million general office building adjacent to the Los Angeles International Airport. Executive and corporate staff offices are located in the new building.

Alloy Precision Castings Co. is enlarging its plant at Cleveland to double existing facilities. Completion is slated for late this year.

Vamistor Manufacturing Division of Weston Electrical Instrument Corp. has occupied a new building at Union, N. J.

Sylvania-Corning Nuclear Corp. has broken ground for a plant to manufacture nuclear fuel elements for atomic reactors. The 25,000-sq.-ft. plant will double the company's Hicksville, N. Y., facilities by 50%.

Ryan Aeronautical Co. has opened its new half-million-dollar Engineering and Research Center near the west end of the company's Lindberg Field, San Diego, plant. Installation of equipment is under way.

Sargeant Engineering Corp. is building a 300,000-sq.-ft. addition to its plant at Huntington Park, Calif.

U.S. Semiconductor Products, Inc. has begun operations in a new multi-million dollar plant at Phoenix, Ariz.

Hoffman Laboratories, Inc. will dedicate a 3-story engineering building in August at Los Angeles.

Ryan Aeronautical Co. has opened a new Engineering and Research Center adjacent to its plant at Lindbergh Field, San Diego.

North American Instruments, Inc. has changed its name to Northam Electronics, Inc. Headquarters is at Los Angeles.

Electrosolids Corp. has acquired a 4½-acre plant site at Canoga Park, Calif. Firm will build 10,000-sq.-ft. light assembly building on tract.

Temco Aircraft Corp. has opened a 100,000-sq.-ft. engineering center at the company's Garland, Tex., facility.

The Narda Corp., Mineola, N. Y., has set up a production test department to handle increasing production test activity on its commercial and military microwave products.

Miniature Precision Bearings, Inc. has begun construction of a $300,000 addition to its plant at Keene, N. H. Completion is slated for January 1.

Sperry Phoenix Co., Division of Sperry Rand Corp., has opened its permanent facility in Arizona. The $1,000-sq.-ft. plant is producing flight-control systems for advanced aircraft.

Electro Mechanical Products Co. has established a slip-ring division at Garden City, Mich.

CONTRACTS

Department of Commerce has announced the following contracts:

Douglas Aircraft Co., Inc., $24,084,477, launching area items for Nike Hercules.

Chromcraft, Inc., $3,934,720, airborne rocket launchers.

Stromberg Carlson Div., General Dynamics, $1,259,399, receiver transmitters.

Phillips Petroleum Co., $5,332,235, M15 Jato with igniter.

Sanders Associates, Inc., $1,546,980, listening sonabuoys.

International Business Machines Corp., $2,723,916, SAGE data-processing equipment.

Gilfillan Bros., Inc., $2,524,158, landing-control sets.

Jayval Co. of New Mexico, $2,193,481, parachutes.

Northrop Aircraft, Inc., $6,966,695, modification of F-89.

Consolidated Diesel Electric Corp., $4,-812,040, MD-3 generator sets.

Crosley Division, $6,632,000, air traffic control centers.

Aircraft Engineering & Maintenance Co., $1,125,666, rehabilitation of F-80G aircraft.

O. A. Sutton Corp., $2,046,073, jettisonable fuel tanks and data.

Cardox Corp., $1,225,067, aircraft fire-fighting and rescue trucks.

Royal Jet, Inc., $2,056,616, tank assemblies.

Jayval Co., $2,193,481, parachutes.

Boeing Airplane Co., $1,759,773, contract change for B-52.

Radioplane Co., $1,403,374, design work on XQ-4A drone system.

Curtiss-Wright Corp., $1,094,000, overhaul and modification of J65 jet engines.

General Dynamics Corp., Stromberg-Carlson Division, $17,528,850, passive electronic equipment, and **$1,259,399, AN/APN-69,** radio beacons and spare parts.

Sikorsky Division of United Aircraft Corp., **$16 million, H-37A** helicopters.

General Electric Co., $16 million, radar search fire control systems for **F-104 A & B** aircraft, maintenance and engineering data.

Fairchild Aircraft Division, $2,500,000, C-123B airplanes.

McDonnell Aircraft Corp., $6 million, implementation program for **F-101B** aircraft spares, training equipment, GHs and engineering data.

Republic Aviation Corp., $2,362,000, production implementation for **F-105C** aircraft to meet specified delivery schedule.

Collins Radio Co., $2,110,835, radio receivers and dynamotors.

Hazeltine Corp., $3,147,475, radar sets.

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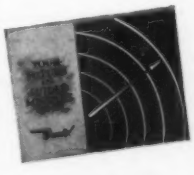

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EN ROUTE

by Wayne W. Parrish

More about Darwin, an unhappy town

LET ME TELL YOU more about this town of Darwin in the far north of Australia. My Italian taxi driver who could think of nothing good to say about the place had been wrong in one respect—the town has about 10,000 inhabitants by liberal estimate, not 6,000. But in terms of eating, entertainment and shopping facilities, it was on a par with a town of less than 1,000 in the U.S.

My idea of establishing a cozy base of operations in the Hotel Darwin vanished into thin air when I walked in. There was a lounge with tables and a small dance floor and an old piano and a radio, and a small bar, but nobody was around. Beyond the lounge was a dining room, closed up tight. You could sit near the large open windows if you didn't mind the flies, or you could sit in the center of the room under a large ceiling fan and cool off a little and escape the flies.

Qantas had a downtown office in the lobby, but I had spotted the MacRobertson-Miller Airline office a few doors down the street, so I walked there under an overhang to see if I had a seat to Perth if and when the DC-3 arrived.

Sure enough, a friendly, tall Aussie dressed in shorts said I was listed for the flight, but he then began giving me the bad news. The cyclone disturbance was centered only 120 miles south of Darwin and had been stationary for awhile. It might move up to Darwin or move east through the desert; it was anybody's guess. Meantime no plane had gotten through for a week and he could give me no assurance whatever. But if I kept in touch he would keep me advised.

I am the eternal optimist when it comes to airline schedules and my optimism proves out most of the time, but in this instance I was doomed to failure even though I didn't know it at the time. On the floor of the MMA office were piles of cargo and sacks of mail, all backlogged because of the weather. With only two DC-3 flights a week, a disruption of schedules like this could be serious.

Unhappy people, too

The rain let up temporarily and I headed out for a walk around the town. I went slowly because if I had gone fast I would have made the complete round in about ten minutes. There were two saloons, big ones, pretty well filled even at that hour with beer drinkers. The standup bars were very long. No chairs or seats were available except in a separate lounge for mixed patronage.

There were quite a few Chinese merchants and I spotted some other immigrants operating a few shops. Nothing was very attractive. The streets were paved, for the most part, and there were sidewalks available most places. I wrote down in my notebook my first conclusion about Darwin: "An unattractive town understandably populated by unattractive people who seem quite understandably to resent their fate of having to live there." This estimate was a little harsh, but it was my preliminary one.

I began feeling that I could get as lonesome in Darwin as I did in the Soviet Union. Even the language seemed to be about as un-understandable, and the expressions of the people were about as dour and sour as in the U.S.S.R.

It being near lunch time I inspected the hotel dining room, the only place in town for a meal, and found that the hours were quite rigid. A sign on the door said that "casual diners should call at the hotel office for a docket."

Blow me down, that was a new one. I deducted that I was a casual diner, but I had never heard of a docket so I took a chance by calling at the hotel desk and asked for a docket for lunch. By golly it worked. I got a ticket. (After getting back to U.S.A. I checked with the dictionary and discovered that sure enough a docket can be, among other things, a ticket.) Amazing people, those Australians. After I did get a docket I was told that I should pay for my lunch in the dining room. Maybe somebody can unscramble that one for me. I can't.

Seating problem—tsk tsk

Anyway, I was among the first to appear for lunch when the doors opened promptly at 12 noon. So I presented my docket to a nicely-dressed and not unattractive female of, let us say, thirtyish on the age scale and she allowed as how I must just be a casual diner so she consulted a big ledger book by which she assigned guests to various tables. Took quite a study, too. This was a big production, seating me for lunch. After all, there must have been twenty tables. But small matters can loom most awfully large in Darwin.

Bingo, after giving this weighty problem her most earnest consideration, I was directed to a table in the rear and given a seat sideways so I faced a wall. No use shocking the other guests with this crazy traveler, she must have thought.

I've always considered Australia to be part of the English world and maybe some customs differed from the rest of us but by and large we were all pretty much the same. Not so in Darwin. Not by a long shot at a kangaroo, no sir, indeed.

I've been faced with many a menu but here was one that baffled me. It was clear that for a first course I could have soup, which I ordered, and which was quite good. On the menu soup was given the French name of potage but the waitress pronounced it like cottage. Ah well, a minor matter, but what threw me were the next two items, one of which had a choice of entree, and followed by collation of cold meats. I forget what I ordered but it was an entree and the waitress wanted to know if I wanted the entree as an entree or as a main course. I said the latter, so I had a good meal.

At dinner, however, I finally asked the gal who ran the dining room what the menu was all about. Well, it seems that in Darwin they follow the dictionary. An entree is but a "taste," as she explained, while the main course follows. She is right, too, according to the dictionary, but in the west and even in France the word "entree" is now generally considered to be the main dish. I wish I had brought along the Darwin menu to report it accurately but I'm here to tell you that it had me more confused than any menu outside of the U.S.S.R. where, no matter what you order from the English courses, you get something else.

Definitely not recommended

I hate to dwell so much on Darwin but I feel that I'm a veteran and have an obligation to warn others who might get stuck there.

After lunch I made another walk around town, this time near the harbor—no boats in or expected—and then dropped by MMA for the really bad news. No DC-3 would come today and none expected for some days. The two stalled airplanes had been ordered to return to Perth far down south. Did I want to wait for three days or would I go to Sydney? I decided to cancel MMA and go to Sydney.

Ah, but how to get to Sydney? That began to present a problem. It was only 2,000 miles away and the pioneers probably made the trek in half a year's time. By air it could be easy—if there was an airplane. TAA finally had gotten its engine fixed and its DC-4 had taken off and there wouldn't be another TAA plane until 1 a.m. the second day from now. Qantas was the only other airline and they didn't have a seat open for days but they might try to get me on a DC-4 cargo plane, and even if they did they would have to charge me a very high fare because of a deal they had with TAA not to carry any domestic passengers in competition except at a robber baron's blackmail fee. I forget what the fare was now but I know I gasped when the Qantas bloke told me what it would be. So TAA was about my only hope. That meant a night, a full next day, and the following evening until midnight in this lovely tropical port of Darwin. Me and my big ideas about taking a local service around the west coast of Australia! I had had it.

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Flying Fair Lady

—Harriet Quimby, America's First Licensed Woman Pilot

(Photos courtesy Institute of Aeronautical Sciences)

Pretty Harriet Quimby attained success in two masculine strongholds—journalism and aviation—in a day when women were not even allowed to vote.

While still in her teens, Miss Quimby became a newspaper reporter in San Francisco; and, in a short time, advanced to the position of Drama Editor on Leslie's Weekly in New York. There she learned to fly under the guidance of John Moissant, famous early-day aviator. It was on August 1, 1911, that Miss Quimby became America's first licensed woman pilot. Then, following months of preparation, Miss Quimby flew the English Channel on April 16, 1912—the first woman to do so.

Miss Quimby returned to America and made exhibition appearances in this country and Mexico. Noted for her beauty as well as her daring, Miss Quimby was a symbol of increasing feminine equality for American women.

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